THE MARINE REVIEW

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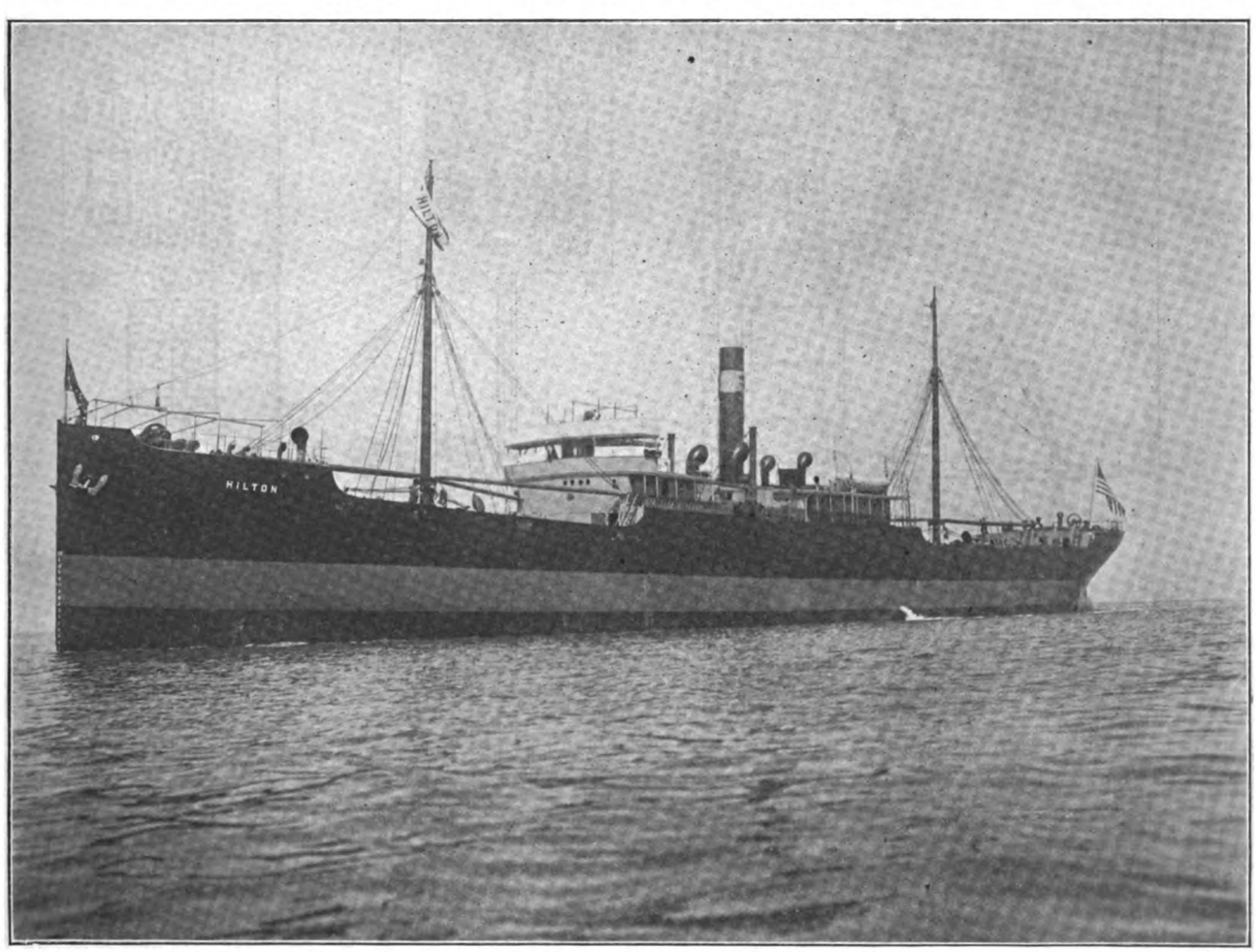
STEAMER HILTON

THE latest addition to the fleet of the A. H. Bull Steamship Co., of New York, is the steel freight steamship Hilton, which was delivered by the Newport News Ship Building & Dry Dock Co., on July 8. The vessel is in general a duplicate of the S. S. Ruth, which was completed last August, and is constructed likewise on the Isherwood system of longitudinal framing, which has given such satisfaction on that vessel.

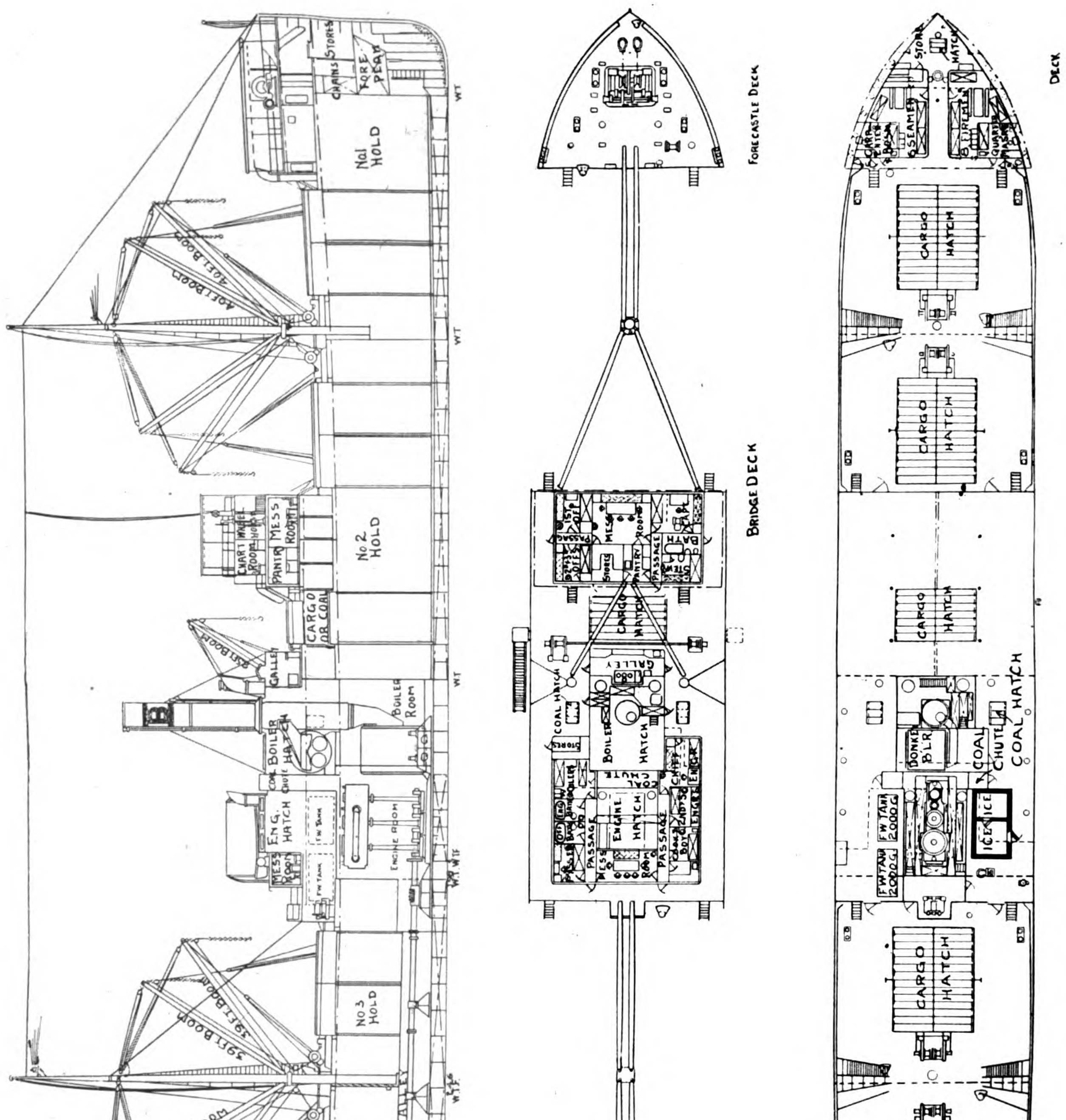
The contract for the Hilton was awarded Dec. 15, 1910, so it will be noted that less than seven months was occupied in its construction.

The general appearance of the vessel and the details of construction are shown by the illustrations. The leading dimensions are:

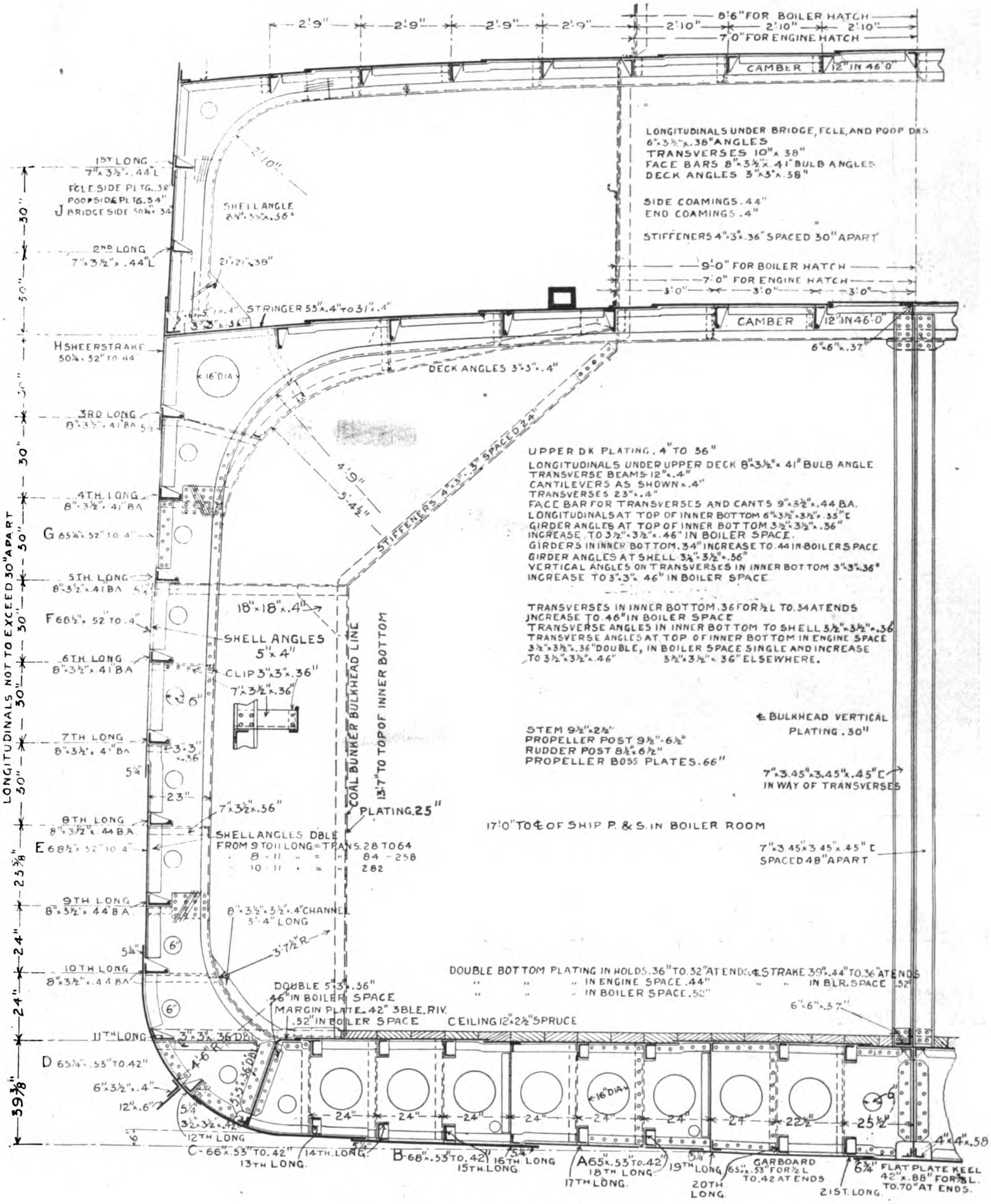
Length over all, 328 ft.; length from fore side of stem to after side of rudder post, 318 ft. 6 in.; beam, mold-



STEAMER HILTON, FOR A. H. BULL & CO., OF NEW YORK, BUILT BY THE NEWPORT NEWS SHIP BUILDING & DRY DOCK CO., NEWPORT NEWS, VA.



Inboard Profile and Deck Plans of Steamer Hilton.



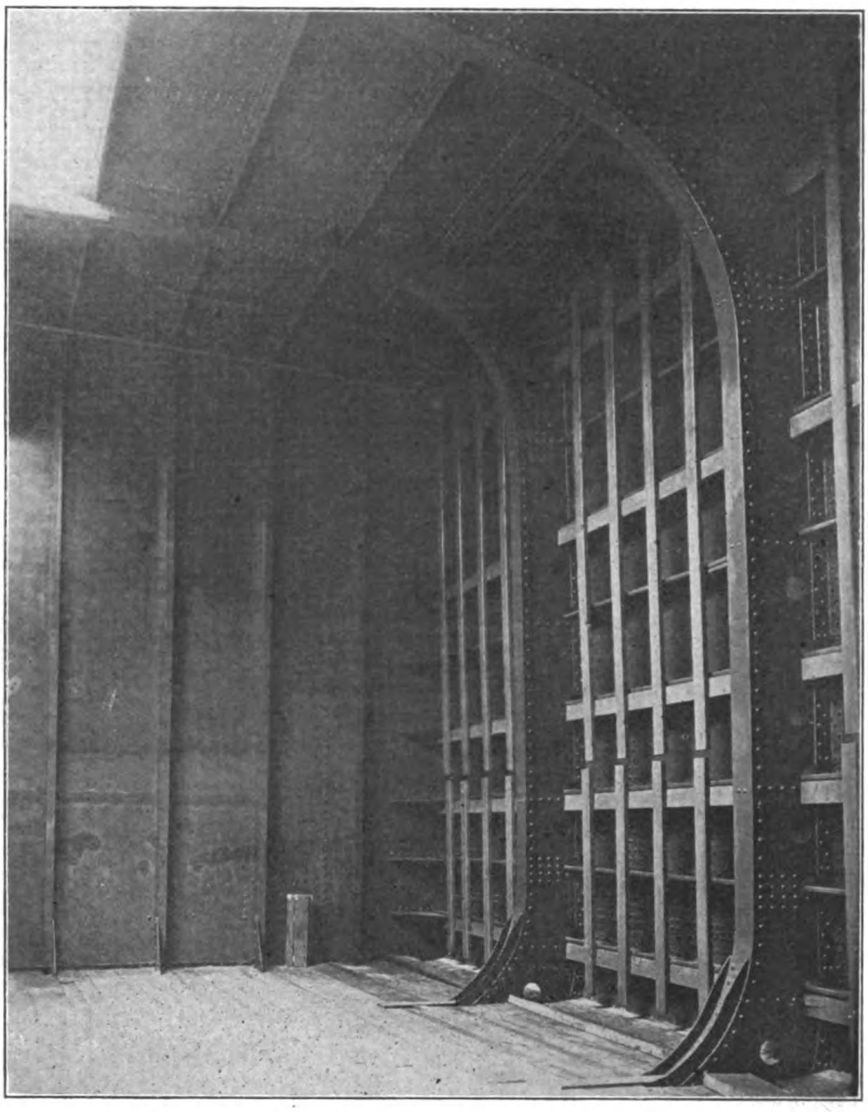
Midship Section of Steamer Hilton.

ed, 46 ft.; depth, molded, 24 ft. 3 in.; load draught, 20 ft.; deadweight capacity at load draught, 4,720 tons; coal bunker capacity, 784 tons; cargo capacity, 248,000 cubic ft.

The vessel is fitted with one triple-expansion engine; cylinders 22 in., 37 in. and 60 in. diameter by 42 in. stroke; two Scotch boilers, 15 ft. diameter by 10 ft. 10 in. long, built for 180 lb. pressure, natural draft, and one donkey boiler, Scotch, 9 ft. 6 in. diameter by 9 ft. 4 in. long, built for 180 lb. pressure. There is a steam windlass, a steam capstan aft, an electric plant, a refrigerating machine and five steam winches.

The vessel was built under special survey of British Lloyds to their highest class.

The Delaware, Lackawanna & Western railroad has decided to dismantle its ore machinery at Buffalo, and use the dock for other purposes. It will therefore have no ore facilities at Buffalo.



SHOWING HOLD CONSTRUCTION OF STEAMER HILTON.

Armor Piercing Projectiles

ADMIRAL Togo, the hero of the Russo-Japanese war, who represented Japan at the coronation of King George V, utilized the opportunity to visit Sheffield works. He devoted most of his attention to the Hecla and East Hecla works of Hadfield's Steel Foundry Co., Ltd., for the purpose of witnessing the production of war material. The admiral was shown projectiles of all types and calibers of various governments as well as a number of armored structures made of Hadfield's steel. Among other exhibits was a set of armor piercing shot, which had perforated unbroken Krupp's cemented plates of the latest type. At the subsequent luncheon Sir Robert Hadfield made a speech in which, after welcoming the admiral, he said:

"A big gun demands a highly efficient projectile, taxing all the skill of the metallurgist to produce. To perforate a modern Krupp cemented armor is a very different problem from that of perforating all steel or compound plates. The projectile must be of the best possible quality, demanding much scientific skill and technical ability in its production. Not only must the steel of the projectile be of great purity, but its heat treatment and the examination of its chemical and micro structure demand knowledge and skill of the highest technical order. That my firm has succeeded in solving this problem has been shown to you. Not only have we now successfully manufactured projectiles of 14 in. caliber, weighing nearly three-quarters of a ton each, but we can now make such projectiles —also those of 12 in. caliber—to perforate the hitherto invulnerable hard-faced plates at quite low velocities and emerge unbroken. In some recent tests the Hadfield 'Heclon' projectile not only passed unbroken through a 12 in. plate, but traveled also two miles beyond the plate and target, a very remarkable feat, proving how much scientific research and technical ability can do for projectile manufacture."

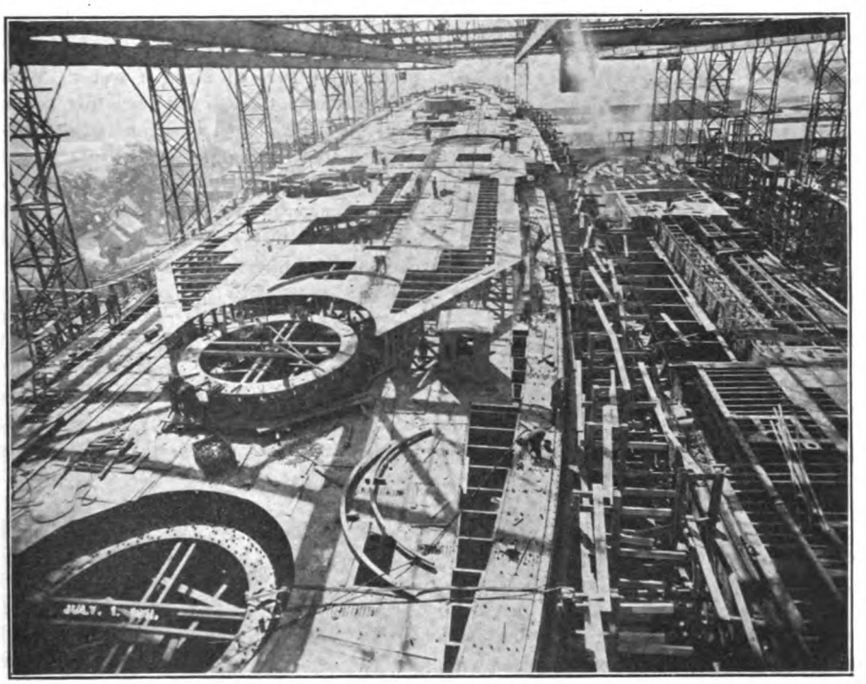
The World's Ships

The statistical tables which precede the publication of Lloyd's Register Book each year, have now been issued. According to the tables the steam and sailing vessels in the world number 30,087, and measure 43,147,154 tons gross. Of these 9,334 vessels of 17,872,697 tons belong to the United Kingdom, 2,108 of 1,546,127 to British overseas dominions—a total British tonnage of 11,442 vessels and 19,418,-824 tons. The United States comes second with 3,446 vessels of 5,158,278 tons—sea and lakes; Germany third, with 2,199 vessels of 4,466,880 tons; Norway fourth, with 2070 vessels of 2,154,331 tons; Frnce fifth, with 1,478 vessels of 1,976,862 tons; Italy sixth, with 1,077 vessels of 1,340,508 tons; Japan seventh, with 866 vessels of 1,-203,220 tons; and Holland eighth, with 659 vessels of 1,058,287 tons. During the year 1910 Lloyd's Register classed a grand total of 583 vessels of 1,057,-428 tons. Of these 480 vessels of 873,-982 tons were built in the United Kingdom. Of the total 518 vessels of 1,056,389 tons were built of steel, and 65 of 1,039 were wood and composite. For United Kingdom owners there were classed 348 new steamers of 753,016 tons, and thirty sailing vessels of 1,609 tons, and for British colonies and other countries 169 steamers of 302,273 tons, and thirty-six sailing vessels of 530 tons. The tables also show that there was a decrease of sixty-nine in number of vessels registered in the United Kingdom, but an increase in tonnage of 59,169 tons gross.

Mandel Sener, formerly press agent of the Baltimore & Ohio railroad, has been appointed by the Greater Baltimore committee as associate publicity agent. Baltimore has planned a campaign of publicity to direct attention to its advantages as a manufacturing and shipping port and certainly Mr. Sener's experience has been such as to make him a most efficient promotor of publicity.

ARGENTINE BATTLESHIP RIVADAVIA

THE following description of the Argentine battleship Rivadavia now under construction at the yard of the Fore River Ship Building Co., Quincy, Mass., is translated from La Nacion, Buenos Ayres:



BATTLESHIP FOR ARGENTINA UNDER CONSTRUCTION AT THE YARD OF THE FORE RIVER SHIP BUILDING CO., QUINCY, MASS.

Displacement.

The normal displacement under ordinary conditions is 26,500 tons, but the trial displacement with all weights complete and 1,600 tons of coal (40 per cent of the total) will be 27,500 tons. This large displacement will make the boats very seaworthy and insure them a high offensive and defensive efficiency; such displacement being in accordance with the latest types under construction, Arkansas and Wyoming, of the United States navy, of 26,000 to 26,400 tons; Hercules and Colossus, of the British navy, of 24,000 to 25,000 tons (but with only 10 12-in. guns); and the Lion, also of the British navy, with a displacement of 26,000 tons, on all of which the main battery is arranged to fire on either side.

Hull.

The hull will be of the following dimensions: Length, 585 ft.; breadth, 93 ft.; normal draught, 27 ft. 6 in.

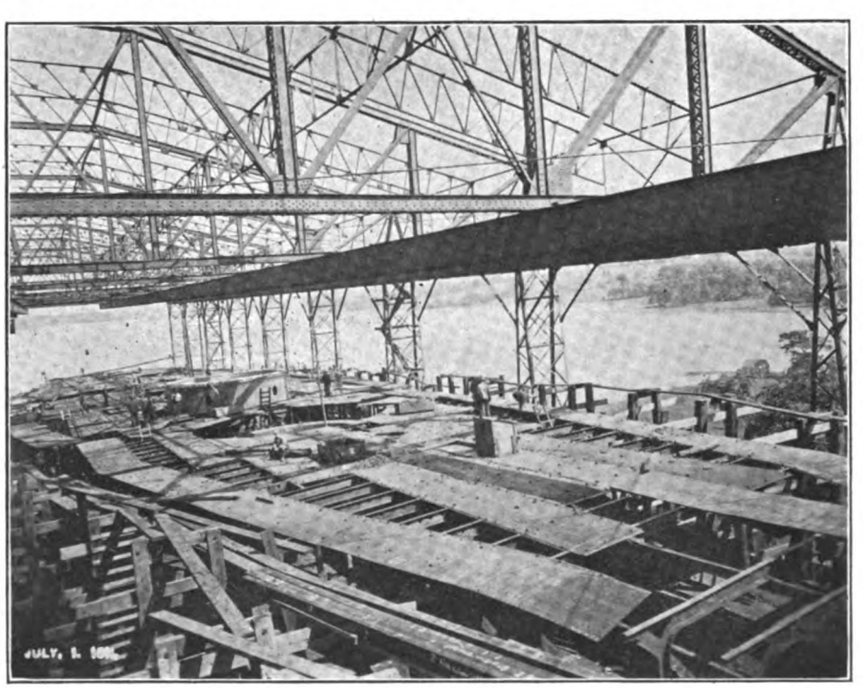
The heights above the normal water line will be as follows: Forecastle, 25 ft. 6 in.; amidship, 22 ft. 8 in.; astern, 17 ft. 1 in.

These heights agree with those of English and American Dreadnoughts, as it is generally conceded that a forecastle lower than 20 ft. would impair seaworthiness. Externally our boats will appear much like the British Lion, whose keel has just been laid at the dockyard at Davenport, or much like the Arkansas and Wyoming, now building for the United States navy at the yard of the New York Ship Building Co., and Cramps, respectively. The superstructures on the upper deck will be completely suppressed to avoid obstruction to the arc of fire of the main guns, as well as to reduce the target surface.

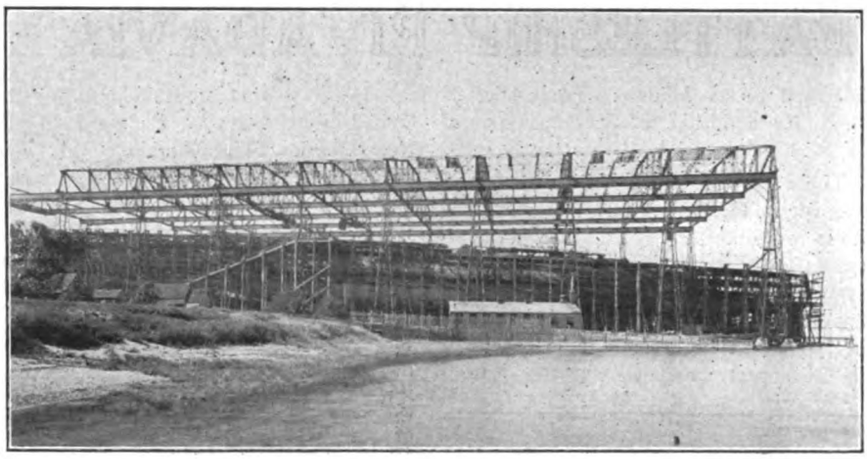
Armor.

For the protection of machinery and boilers there will be a main armor belt of 12 in. uniform thickness, 200 ft. long and extending 4 ft. 9 in. above and 3 ft. 4 in. below the normal water line.

This belt will be continued 75 ft. more at each end till it comes abreast of the extreme turrets, but its thickness is reduced to 10 in. These belts will taper down from their original thickness to a thickness of 5 in. at the lower edge in a height of about 2 ft. On top of the main belt for its whole length of 400 ft. there will be armor 9 in. thick at its lower edge, tapering down to 8 in. at the upper deck. Beyond the central redoubt the armor belt will be 6 in. thick forward and 4 in. thick abaft and will extend from the same depth below the water line up to the gun deck. Besides the main belt and the side armor extending between centers of the extreme turrets there will be also, at the level of said turrets, some transverse armor extending from side to side, thus completing the armored box that will protect the machinery, boiler, magazines —the main and secondary batteries. Above the upper deck there will be ar-



THE ARGENTINE BATTLESHIP UNDER CONSTRUCTION AT THE FORE RIVER YARD.



SECTION OF FORE RIVER YARD SHOWING ARGENTINE BATTLESHIP ON THE STOCKS.

mor 6 in. thick for protection of the 6 in. guns. To avoid all dangers inherent to perforation of the smokestacks, same will be protected by 1½-in. nickel steel extending from their base up to 15 ft. above upper deck. The arrangement of armor follows English, American and Japanese ideas, but as regard thickness and distribution, it resembles what has been adopted on the Japanese ships now building. The total weight of all armor, barbettes, turrets, etc., amounts to about 7,000 tons.

Submarine Protection.

Six hundred tons of nickel steel has been allotted for this purpose, and it will be used for an inner bottom, and two longitudinal bulkheads, one on each side. This protection will be completed by the ordinary double bottom and the system of transverse and longitudinal bulkheads, dividing the ship in numerous watertight compartments fitted with electrically driven centrifugal pumps, which can be operated even when the compartment is entirely flooded. Externally a steel torpedo net is held 30 ft. from the ship's sides.

Machinery and Coal Bunkers.

The motive power is composed of steam turbines, located in three separate and independent compartments. The main boilers are arranged in six compartments, three forward and three abaft of the engine rooms. In the case of serious accident to the wing turbines, this arrangement of machinery allows the use of the central turbine, which can develop more than one-third of the total power, while the subdivision of the main boilers in two groups always allows the use of at least one-half of the boiler power, and at the same time permits an ideal arrangement of coal bunkers.

The coal bunkers run alongside and above the boilers; and on each fire room there is also a transverse bunker for use in action, when, owing to the easier handling of the coal it will be possible to attain the maximum speed.

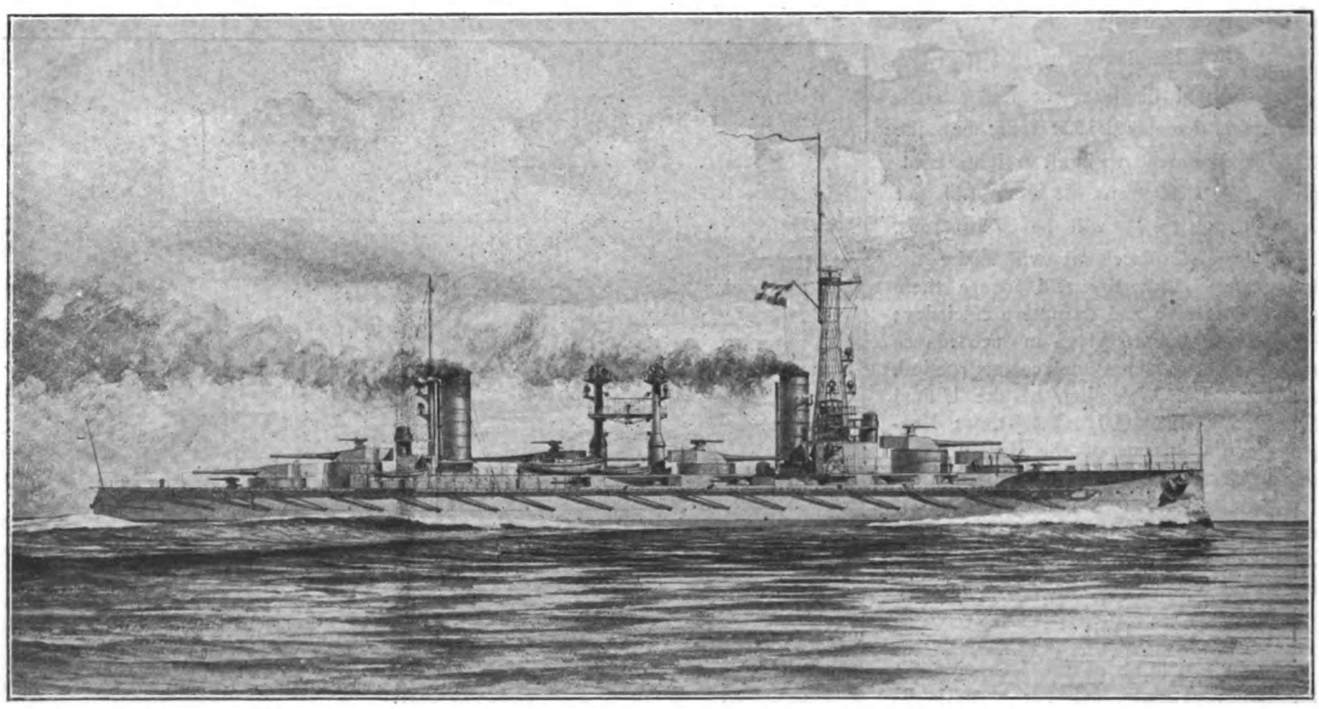
The coal bunkers have a total capacity of 4,000 tons and the oil tanks in the double bottom will contain 660 tons of fuel oil.

Speed Trials and Radius of Action.

The main turbines can develop 39,500 H. P. with 1 in. of air in the fire rooms, but the blowers will be required to produce a pressure of 2 in. of water. With a displacement of 27,500 tons this power will give the ship a speed of 22½ knots that is to be maintained for eight hours. Besides this trial, which is to be considered as the most severe and which will amply insure the ship a speed of 22½ knots under ordinary service conditions, there will be a 30-hour endurance trial at 20 knots, and a 30-hour coal consumption trial at 15 knots. All these trials will be preceded by the necessary preliminary trials. The radius of action on coal only is to be 10,100 knots at 11 knots speed; 7,200 knots at 15 knots speed, and 3,600 knots at 22.5 knots.

If the high speed trial were conducted under ordinary load conditions, the displacement would be 26,500 tons instead of the required trial displacement of 27,500 tons, and the corresponding speed at the reduced displacement would be nearly 23 knots.

The main battery consists of 12 12-



THE ARGENTINE BATTLESHIP AS SHE WILL LOOK WHEN COMPLETED.

in. 50 caliber guns, mounted on pairs in six turrets arranged so as to fire all on either side; 12 6-in. 50-caliber guns installed in the central casemate, six on each side; 12 4-in. 50-caliber guns, besides smaller field and saluting guns. The 12-in. gun turrets will have a protection of 12-in. armor in front, 9-in. armor at sides, 11-in. armor at back, and 3-inch armor on top.

The circular barbettes which serve as support to the turrets are 9 in. thick. The armor and guns will be manufactured by the Bethlehem Steel Co. The gun data is tabulated as follows:

Caliber of gun.	Weight of shell kg.	Initial velocity, ft. per sec.	Muzzle energy, tons-meters.	Shots per min. per gun.
12	349.2	914.4	16.890	2
6	47.6	914.4	0.2028	6 to 8
4	15	914.4	0.640	12

The 12 guns are capable of perforating an armor plate of cemented steel 14 in. thick at 6,000 meters.

The magazines have a capacity of 120 rounds for each of the 12-in. guns, 300 rounds for each of the 6-in. guns, and 350 rounds for each of the 4-in. guns.

The axes of 12-in. guns above the water line are as follows:

	Ft.	In.
Turrets No. 1 forward	31	8
Turrets No. 2	39	8
Turrets Nos. 3, 4 and 5	31	8
Turrets No. 6	22	5

The axes of the 6-in. guns are 19 ft. 6 in. above the normal water line, and this height was fixed to overcome the faults observed with lower batteries, which in rough water are practically useless owing to the necessity of closing the gun ports. The 4-in. guns and ammunition are equal to be interchangeable with the same size weapon used on the destroyers, which will be manufactured by the same concern. These ships will be fitted with two 21-in. submerged torpedo tubes using torpedoes equal to those that will be used on the destroyers.

Conning and Fire Control Towers.

There will be two conning towers, one forward of 12-in. armor and one abaft of 9-in. armor. The fire control towers will be located as follows: One on the auxiliary mast, one above each conning tower, one auxiliary station on each side of the ship on small independent armored turrets, one main control station within the casemate under the protective deck.

Miscellaneous.

The upper and lower protective deck will have 1½-in. and 3-in. armor. The electric power will be supplied by two main stations in duplicate, each fitted with turbo dynamos, capable of generating all the power required in action and located within the armored casemate. There will also be a third installation, operated by heavy oil motors, of sufficient power to illuminate the ship and also handle some of the turrets for practice. This third station will obviate the necessity of maintaining the boilers under pressure for auxiliary service in the harbor, and which ought to result in better preservation of boilers and steam piping. Searchlights of sufficient number and power will be conveniently located.

JUBILEE MEETINGS OF THE INSTITUTION OF NAVAL ARCHITECTS

By H. C. Sadler.

THE Jubilee meetings of the Institution of Naval Architects which, owing to the death of the late King Edward were postponed to the present year, were held in London during the week of July 3 to 8. This institution may be regarded as the mother of all similar societies representing the science and art of ship building and marine engineering; and this fact was recognized by practically all the maritime countries of the world, there being no less than seventeen nations represented by special delegates. It is, in fact, doubtful if there has ever been a more representative gathering of naval architects and marine engineers from all over the world.

The arrangements for all the various meetings and functions were admirably carried out, and reflect great credit upon R. W. Dana, the secretary of the society, and his assistants.

Each delegate on his arrival was presented with a small pocket book divided into sections which were marked for each day of the week, and contained the various cards of admission, invitations, railroad tickets, etc; also a general program of the proceedings and a guide to London.

The meetings opened on Monday evening, July 3, with an evening reception by the President of the Institution, the Marquis of Bristol and the Marchioness. This was held in the Royal United Service Institution, where some of the most interesting relics and models of all things pertaining to the navy have been collected together. During the reception music was furnished by the band of the Royal marines, and the choir of the Chapels Royal.

Opened in Connaught Rooms.

The opening of the International Congress was held the following morning in the Connaught rooms. Previous to the official opening, the foreign delegates were presented to H. R. H. the Duke of Connaught, who afterwards presided at the meeting and gave the opening address of welcome. Inaugural speeches were also made by the presidents of the various foreign societies, and at the conclusion of them a paper was read by Sir Wm. H. White upon "The History of the Institution of Naval Architects and the Progress of Scientific Education in Naval Architecture." The meeting closed with the election of new members, and the institution commemorated its jubilee by electing several prominent men from all countries as honorary members, amongst whom was Admiral Dewey. Luncheon was then served in the Connaught rooms, and following this a visit to the coronation exhibition. The exhibition is one of great interest as it contains representations of all parts of the British empire. Afternoon tea was served in the grounds of the Garden club, situated in the exhibition, and the guests were received by H. R. H. the Duke of Teck, the father of the present queen of England.

The mornings of Wednesday, Thursday and Friday were taken up with the reading of papers, which, owing to the large number, had to

be read simultaneously at the rooms of the Institution of Civil Engineers and of the Institution of Mechanical Engineers. A complete list of papers follows:

The Program of Papers.

1. "History of the Institution of Naval Architects and the Progress of Scientific Education in Naval Architecture." By Sir William H. White.

2. "Fifty Years' Architectural Expression of Tactical Ideas." By Admiral Sir Cyprian Bridge, G. C. B.

3. "Progress of Naval Construction in Japan." By Rear-Admiral Kondo, Director of Naval Construction, I. J. N.

4. "Progress in Naval Artillery (1860 to 1910)." By Sir Andrew Noble, Bart.

5. "Results of Experimental Tank Tests on Models of Submarines." By Mason F. Chace, Esq., Member Am. S. N. A.

6. "The Rational Application of Turbines to the Propulsion of Warships." By Prof. A. Rateau, Member of Council Assoc. Technique Maritime.

7. "The Marine Steam Turbine from 1894 to 1910." By The Hon. C. A. Parsons, C. B., D.Sc., LL.D., F. R. S.

8. "Fifty Years' Changes in British Warship Machinery." By Engineer-Vice-Admiral Sir Henry J. Oram.

9. "Our Present Knowledge of the Vibration Phenomena of Steamers." By Konsul Dr. O. Schlick.

10. "Development of Merchant Ship Building in Japan." By Mr. Yukawa, Director of the Mercantile Marine Bureau, and Dr. Terano, of Tokyo University.

11. "Fifty Years' Developments in Mercantile Ship Construction." By S. J. P. Thearle, Esq., D.Sc., Chief Ship Surveyor to Lloyd's Register of Shipping.

12. "Shipping on the Great Lakes." By Frank E. Kirby, Esq., vice president Am. Soc. N. A., and A. P. Rankin, Esq., Member Am. Soc. N. A.

13. "Recent Developments in the Sea Transportation of Swedish Ore." By J. Johnson, Esq., Member of Council, Swedish Soc. N. A.

14. "Remarks on the Design and Service Performance of the Trans-Pacific Liners Tenyo Maru and Chiyo Maru." By Dr. Terano and Prof. Baron Shiba, of Tokyo University.

15. "Progress of Naval Engineering in Japan." By Engineer-Rear-Admiral T. Fujii, Engineer-in-Chief, I. J. N.

16. "Some Further Notes on Cavitation." By Sydney W. Barnaby, Esq., Member of Council.

18. "Notes on the Collapsing of Beams and Elastic Curve Slips." By Prof. Marbec, of the Ecole du Genie Maritime.

19. "Fifty Years of Progress in Ship Building in Italy." By Lt.-Col. G. Russo, R. I. N., Member I. N. A.

20. "Warship Building (1860 to 1910)." By Sir Philip Watts, K. C. B., LL.D., D.Sc., F.R.S., vice president, Director of Naval Construction.

21. "Armour for Ships (1860 to 1910)." By Charles E. Ellis, Esq., Honorary Treasurer I. N. A.

Papers Very Valuable.

It will be noticed that most of the papers are of an historical character, and will certainly be of great value from this point of view, in the future. Time did not permit of lengthy discussions but the papers of the more technical character, particularly those by the Hon. C. A. Parsons, Prof. Flamm, S. W. Barnaby and Prof. Rateau came in for a fair share.

Two visits were arranged for the afternoon of July 5, one to the opening of the National Experimental Tank and the other to the Festival of the Empire (Pageant of London) at the Crystal Palace.

Of the two, the greater interest was naturally in the Experimental Tank, which is situated at Teddington (near London) and forms part of the National Physical Laboratory. The erection and installation of the tank are largely due to the generosity of A. F. Yarrow, the celebrated torpedo boat builder, who gave the sum of $100,000 towards the expense of the same. It is 550 ft. long, 30 ft. wide and 12 ft. 3 in. deep. The equipment is of the very latest design and includes the usual model making machinery, dynamometers, etc. The models used are made of paraffine wax. There is also a small tank about 60 ft. long in which the water may be made to circulate, and hence tests of various kinds made in flowing water.

There are also many other interesting laboratories such as those connected with engineering, aeronautics, metallurgy, etc., where systematic research work and standardization is carried out; in fact the institution generally corresponds somewhat with the United States Bureau of Standards.

At the opening ceremony the chair was taken by Sir Archibald Geikie, K.C.B., and addresses given by Lord Rayleigh and the Marquis of Bristol. The Marchioness of Bristol started the carriage which tows the models, on its first official run. Afternoon tea was served in the laboratory grounds, and on the return to London the evening entertainment consisted of a festival concert in the Queens Hall. The choir consisted of 240 voices, and the orchestra of 110 pieces. At the conclusion of the concert supper was served in the same building.

At the conclusion of the reading of papers on Thursday, July 6, the foreign delegates were entertained at lunch by the committee of Lloyds register of shipping; the chairman, Thomas L. Devitt, presiding.

In the afternoon the American ambassador, the Hon. Whitelaw Reid, and Mrs. Reid, held a reception at Dorchester House, for the members of the congress. The Jubilee banquet was held the same evening in the Connaught rooms, the president of the institution presiding. In the replies to the toasts of "Our Guests" and "Kindred Societies," practically all countries were represented.

Reception by American Ambassador.

The afternoon of Friday, July 7, was spent in a trip down the River Thames on the "Royal Sovereign", luncheon being served as the steamer left. The trip proved of great interest to the visitors, as it allowed them to see the shipping of the Port of London and also some of the interesting types of vessels engaged in the same. The party was landed at Tilbury and returned to London by train.

In the evening the delegates were entertained at dinner by His Majesty's government, the First Lord of the Admiralty, the Right Hon. Reginald McKenna, M. P., presiding.

Following the dinner a government reception was held at the Savoy hotel.

By command of His Majesty the King, a special visit was made to Windsor Castle on Saturday afternoon, July 8. The party left by special train from London in the early part of the afternoon and on arrival at Windsor were conducted through all the principal rooms of the castle, where all the various objects of interest were explained. Refreshments were served in the grounds below the terrace, after which the party returned to London and so concluded the last of the functions.

It was certainly the unanimous opinion of all the delegates, that everything that was possible had been done for their entertainment during the

memorable week. The arrangements were excellent throughout and perhaps the only criticism that could be made was that the visitors were nearly "killed by too much kindness."

The American Society of Naval Architects and Marine Engineers were well represented by the following members:

Stevenson Taylor, Esq., president; Clement Griscom, Esq., past president; Rear-Admiral H. I. Cone, Rear-Admiral R. M. Watt, Rear-Admiral W. L. Capps, H. L. Aldrich, J. R. Andrews, Edward P. Bates, M. S. Chace, Prof. William Hovgaard, F. B. King, Naval Constructor J. H. Linnard, W. W. McFarland, Prof. C. H. Peabody, Commander M. E. Reed, U. S. N., Prof. H. C. Sadler, Charles Ward, Naval Constructor William J. Baxter, secretary and treasurer, W. T. Donnelly, Marley F. Hay, F. A. Hunnewell, F. Lilliehook, A. J. Maclean, G. Matteson, E. A. Sperry, C. Swan, C. C. Thomas, G. R. Tuska.

The Bulk Freighter of the Great Lakes

AMONG the interesting papers read at the Jubilee meeting of the Institution of Naval Architects in London, was one on the "Bulk Freighter of the Great Lakes," by Frank E. Kirby and A. P. Rankin. The paper was necessarily made brief, owing to the time limitation set upon its reading. It is abstracted in part as follows:

Consisting of a series of inland seas, known as Lakes Superior, Michigan, Huron, Erie, and Ontario, reaching east and west 1,000 miles, and half that distance north and south, with a water surface of over 90,000 sq. miles, and a drainage basin of 275,000 sq. miles, connected throughout by navigable channels and discharging through the St. Lawrence river into the Atlantic ocean, they may be justly considered, from their magnitude, the great area of the region drained by them, and their beneficial effect on the climate, one of the most important physical features of the North American continent. The development of the freighter on the lakes is so interwoven in its history with the improvement of the waterways and the perfecting of the cargo-handling apparatus, that it would be impossible to follow one without tracing also the simultaneous advance of the other. A somewhat superficial review, however, touching only on the most important steps, must suffice to lead up to the bulk freighter of the great lakes as she exists today. This type of ship is engaged exclusively in the carrying of iron ore, coal and grain. The ore trade is entirely down the lakes, or east bound, the principal shipping points being Duluth, Superior, Two Harbors, Ashland and Marquette on Lake Superior, and Escanaba on Lake Michigan. Of the 42,620,201 tons carried during the navigation season of 1910, 34,042,897 tons were received at Lake Erie ports, the balance being delivered to those of Lake Michigan. The grain traffic, also east bound, amounted in 1910 to 245,171,762 bushels, the principal shipping ports for United States grain being Duluth, Superior, Chicago, and Milwaukee, the receiving ports being Erie and Buffalo, from where it is shipped by the Erie canal railroads for distribution and export. Port Arthur and Fort William, Ont., are the storage and shipping points for the grain from the Canadian northwest, most of which is carried to the seaboard for export between September and December. The larger steamers transfer to the railways at Georgian bay ports, while those of Welland canal dimensions cover the entire route from the head of the lakes to Montreal. The coal trade, being all west bound, forms a convenient return cargo for steamers which are not exclusively engaged in the ore trade. It ranks second in volume, and during the navigation season of 1910 18,406,469 tons of bituminous and 4,170,813 tons of anthracite coal were shipped west from Lake Erie ports. The iron ore trade is, of course, the most important, and the relation of the lakes to the mining and transportation of the ore has done more to establish the position of the United States in the iron and steel trade of the world than any other fact.

Early Days of Ore Trade.

In the early shipments the ore was laborously hauled to the lake, wheeled on board small sailing vessels, and at the "Soo" had to be unloaded, carried over the portage of about a mile, and below St. Mary's Falls was again loaded upon vessels, and so carried to the lower lakes. Meanwhile, a canal around the rapids at Sault Ste. Marie was under construction, work being commenced in 1852, and on June 18, 1855, the canal was opened for traffic. For the first few years almost all the ore shipments were made on small sailing vessels, on which, owing to their construction, with the ordinary hatchways, this method of loading could be used. The few steamers of those days all carried passengers, and were in no way adapted for the transportation of ore. As the channels were not lighted navigation through them ceased at nightfall, and the custom was for the schooners to be towed through the rivers, numbers of tugs finding steady and profitable employment in this connection. In the sixties this was the general method of ore transportation on the lakes, and in 1860 114,401 tons of iron ore represented the year's business in that commodity.

At this time the method of unloading ore at the Lake Erie ports was an exceedingly slow and laborious one.

The work was usually done by contract, the means employed to elevate the cargo from the hold being tubs, operated by blocks and tackle with horses as the motive power, and wheelbarrows then served to convey it ashore. To unload a 400-ton cargo in two days was accounted excellent work. The year 1869 marks an important change in the business of ore carrying in the introduction of the steamer and consort. In that year the steamer R. J. Hackett was built at Cleveland, Ohio, being, as the term is now generally understood, the first bulk freighter on the great lakes. She was of wood, 211 ft. long, and 33-ft. beam, the propelling machinery being placed aft. Her hold was continuous, and her hatches spaced 24 ft. centers, influenced, no doubt, by the design of the early loading docks on Lake Superior. She had a carrying capacity of about 1,200 tons, the draught being, of course, fixed by the 11½ ft. of water at the "Soo" locks. In unloading no material advance had been made, the portable engine, buckets, and wheelbarrows prevailing as late as 1880. The first real improvement was introduced at Cleveland by the building, in 1882, of a cable-way machine designed by Alex. E. Brown, which marks the beginning of the speedy development of the material handling machinery on the lakes. It consisted of a number of cables, each supported on two fixed piers, one at the dock face and the other some 300 feet back. On each cable ran a one-

ton ore bucket, controlled in its movements from a central station. The buckets were filled by hand in the hold, the machine lifting out, depositing the ore on the storage pile or directly into the cars, and returning the empty bucket to the hold without further hand labor. Although an infinite improvement over the old method, the limitations of a machine with fixed piers was soon realized, in that it could cover only a limited storage pile, and it soon gave place to the type carrying a rigid bridge structure instead of the cable, the piers being mounted on wheels and movable along the length of the deck. This type was brought to great perfection by the Brown Hoisting Machinery Co., of Cleveland, and became the almost universal standard, their capacity being largely limited by the speed of filling the buckets.

Steel for Ship Building.

Steel was first introduced in the construction of bulk freighters on the Lakes in the building of the Spokane in 1886, and this speedily became the only material used. When in 1884 the 16-ft. channel became available, a great many steamers of 1,500 to 1,900 tons net register, with a carrying capacity of about double that amount, were in use. In 1888 iron ore became the leading article of commerce on the lakes, a position which it has retained uninterruptedly since, and from that time the vessels built for that trade were greater in number and larger in tonnage than those for any other. In constructive features they were yet practically he same as the Hackett and Forest City. Steel had been substituted for wood, the double bottom had been added, but the internal arrangements remained substantially the same. The demand for deeper waterways on the Lakes has been unceasing, and the 16-ft. channel was no more than completed when it was realized that it was totally inadequate to the demands of the commerce, and measures were taken toward increasing it. The improvements included the further deepening of the St. Mary's canal to 25 ft. and the building of a new lock 800 ft. long and 100 ft. wide, with 22 ft. of water over the sills. This, the present "Poe" lock, was built on the site occupied by the first lock, and was opened for traffic in 1896. Simultaneously, the work on the Canadian canal and lock had been carried on, it being completed the year previous. The channels through the connecting rivers were also improved by deepening, straightening, and making safer for night navigation, and the effect of this new 20-ft. channel was immediately felt in increased ship dimensions. In 1896 more than half the tonnage in bulk freighters built exceeded 2,000 tons net register, while six years previously not a single vessel of this tonnage was in service.

The Hulett Unloader.

In 1899 there was installed at Conneaut, Ohio, a new type of ore unloading machine, the "Hullet," operating a self-filling or "grab" bucket, which marked a point of radical change, both in the design of unloading machinery and in the internal arrangements of the ships. Up to this time the ore had been handled in one-ton buckets, the size found most satisfactory for hand filling, but with the new mechanical buckets the capacity seemed to be limited only by the clear space available in the hold. Since the introduction of the grab bucket two types of machines have been developed, one in which the bucket is suspended by the operating ropes, and the other in which the bucket is mounted on the lower end of a vertical rotating leg operated by an oscillating beam. Operating four 15-ton grab buckets, this machine unloaded from the steamer Thomas F. Cole on Aug. 5, 1910, 11,131 gross tons of ore in 4 hours and 30 minutes, or at the rate of 618 tons per hour per bucket. In 1900 the first "500-foot" steamers appeared, but during the two or three years following the dimensions dropped back slightly. In 1902 the steamer James H. Hoyt was built, with her 19 hatches spaced 12-ft. centers, making it possible to use loading spouts in all hatches simultaneously, and allowing greater freedom in the hold. This created new records for both loading and unloading. Two years later, in 1904, was witnessed the most radical change ever made in the construction of lake freighters. A steamer was built 60 ft. longer than any other vessel on the lakes, and differing materially in construction from the existing type. This steamer was the Augustus B. Wolvin, 560 ft. long, 56 ft. beam, and 32 ft. deep. She had 33 hatches, spaced 12 ft. centers, and her hold construction was novel, beams and stanchions being omitted entirely and compensating strength secured by heavy plate arch girders under the spar deck, between hatches. Instead of the usual practice of running the "tank top" or inner bottom out of the ship's side, it was carried up to the edge of the main deck stringer, the sloping sides forming the hold into a long, continuous hopper. The space thus formed on each side, between the hopper sides and skin of ship, added materially to the capacity for water ballast, the cargo was concentrated within the reach of the unloading machines, and all obstructions to the working of them removed from the hold. The success of the type was instantaneous, and since that time every bulk freighter on the lakes has been built on some modification of this design. Considerable work has been done on the older-type steamers in the re-arrangement of the main deck beams, and grouping of the stanchions, and, latterly, vessels of the earlier type have been entirely changed to the arch or girder construction, for the fact is obvious that for the economical handling of ore by present-day unloading machinery the holds must be entirely free.

An Efficient Beast of Burden.

The bulk freighter of the great lakes today, while not a thing of beauty from the marine architect's point of view is, nevertheless, a most efficient, economical, and capacious carrying machine, excellently suited to the requirements of the business she was intended for and is engaged in. Ordinary practice and accepted formulae have affected her design but little. Extraordinary conditions had to be met, and the result has been the evolution of a type of ship peculiar to the conditions of the trade in which she was to operate. She represents no compromise design, but is planned with a single purpose in view, no thought being given to the possibility of her engaging in business of any other nature. Under present conditions she is still unhampered as to length, and two steamers 617 ft. long are at present under construction. As, however, a width of 60 ft. or over prevents the use of all the "Soo" locks except the "Poe," the possibility of serious delay through the derangement of this lock has to some extent governed the beam of the ships, and 58 ft. has been generally adopted as the maximum up to date, although several steamers of 60 ft. beam are in use. The great length, in comparison to the limited depth available makes the question of longitudinal strength an all-important one, while the extreme athwartship width of the hatches complicates the problem somewhat. The speed of loading ore precludes the possibility of taking the steamer under the loading spouts with any considerable amount of water ballast, as it is impracticable to discharge it as fast as the ore is run in. Therefore, to get the necessary slope of the spouts to

ensure the proper running of the ore, with the ship in a light condition, the hatches are made about two-thirds the beam of the ship in width. The full lines, square middle body, bluff bow, and practically flat bottom, the extreme forward position of the navigating bridge, the long sweep of deck, clear of spars and pierced by hatches from end to end, the hopper hold, free from cross beams and stanchions, and spanned by the deep spar-deck girders, the arrangement of the steel hatch covers, and method of removing and replacing them, the absence on board of all cargo-handling machinery, the large capacity for water ballast, the compactness, simplicity, and economy of the propelling machinery, together with its comparatively low power, the labor-saving devices, the consequent small crew required, and the superior accommodation provided for them, together with the almost entire absence of wood in the construction, are a few of the striking characteristics of the bulk freighter of today.

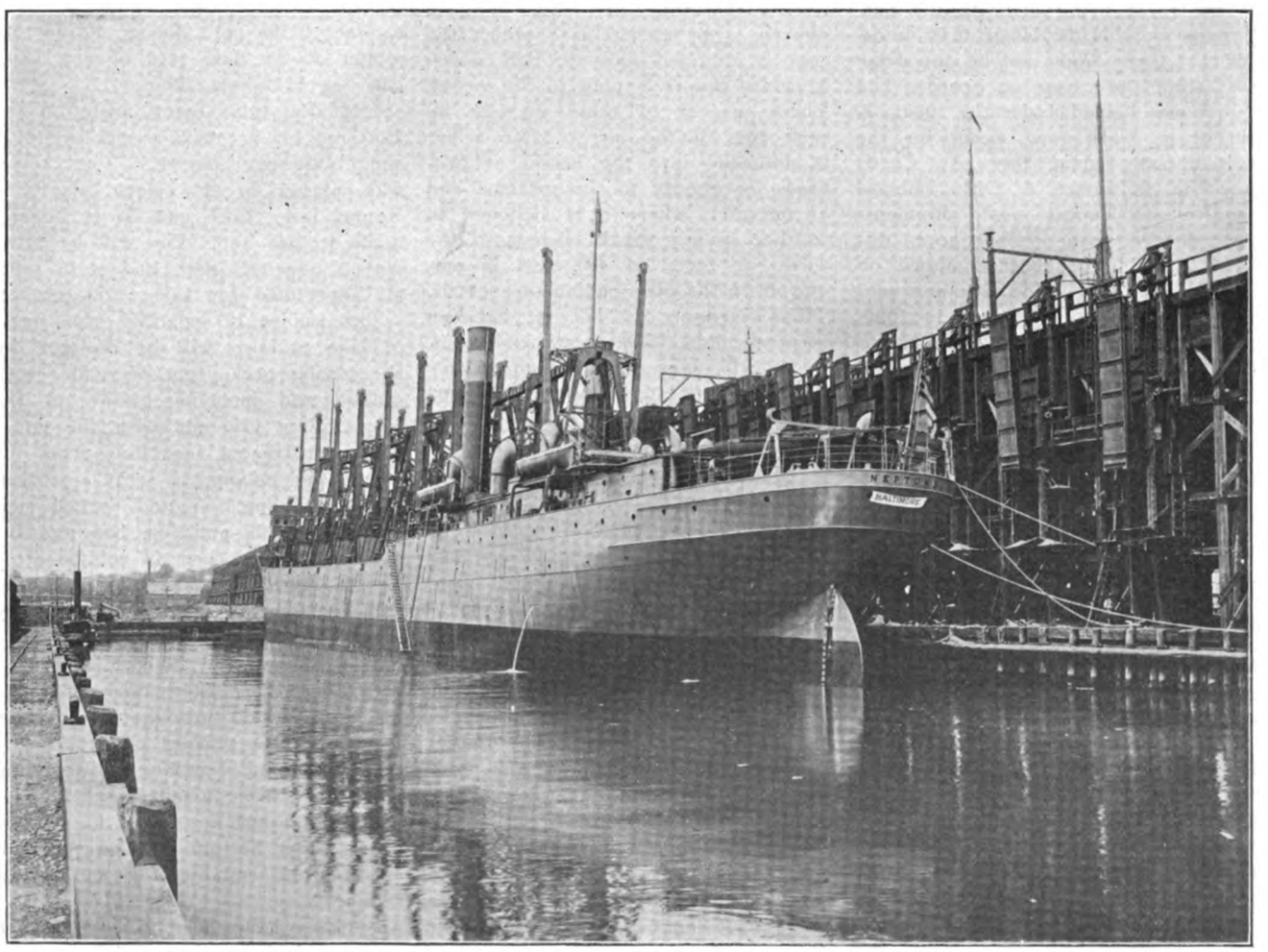
Loading Collier Neptune

THE Neptune, the largest collier in the United States navy, which has just been built at Sparrows Point for the government, tied up at the Baltimore & Ohio railroad's pier at Curtis Bay, Baltimore, Friday morning, July 21, to take on a cargo of coal for delivery to the Atlantic squadron at Delaware breakwater. Great importance is attached to the loading of the Neptune at Baltimore, for she carried 13,000 tons of coal to the fleet of war vessels and her bunkers were loaded with 2,200 tons of coal for fuel purposes, this being the largest cargo of coal ever delivered to a government collier.

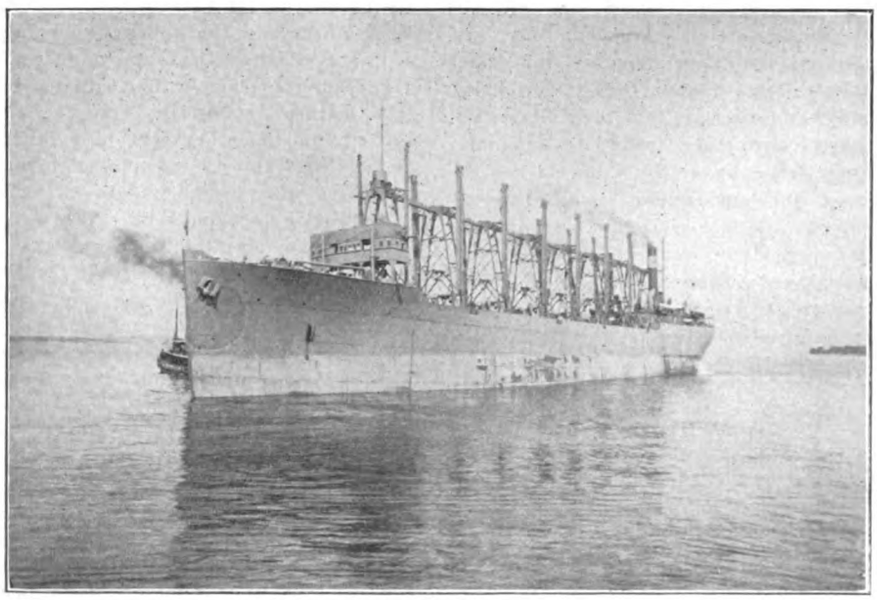
The Neptune is the most modern type of collier afloat, being constructed entirely of steel and equipped for burning oil or fuel, so that on a long voyage to the far east to coal a fleet she could make the journey burning oil for fuel after the supply of coal in her bunkers had become exhausted. This feature is entirely new in the construction of colliers, the only other one of the kind so equipped being the Honolulu, which made a trip to Baltimore for coal some time ago. The Neptune was built by the Maryland Steel Co., and she left Baltimore on her trial trip to join the fleet. The height of the collier from the water line to main deck is 29 ft. 6 in. when light, and 12 ft. 6 in. when loaded. She reached the Baltimore & Ohio pier drawing 10 ft. of water forward and 20 ft. aft.

The coal with which the Neptune was loaded was purchased by the government from the Consolidation Coal Co. The collier was in charge of Capt. Thompson, who piloted her on the trip to the fleet in charge of a crew from the Maryland Steel Co.

The cargo of the Neptune was loaded by 8 o'clock Friday night, a record performance, and the fuel coal was placed in her bunkers Saturday morning. Loading the giant collier in a working day was a remarkable



COLLIER NEPTUNE LOADING AT CURTIS BAY PIER OF THE BALTIMORE & OHIO RAILROAD AT BALTIMORE.



UNITED STATES NAVAL COLLIER NEPTUNE, BUILT BY THE MARYLAND STEEL CO., SPARROW'S POINT, MD.

accomplishment and speaks well for the facilities at Baltimore for export coal shipment. The Baltimore & Ohio terminals at Curtis Bay were the scene of great activity during the loading of the collier, every man of the force being alert to the performance of his particular task in order that there might not be any delay in getting the cargo on board. The collier was loaded under the supervision of E. E. Brewer, agent for the railroad at Curtis Bay. At Curtis Bay the Baltimore & Ohio railroad handles its export coal shipments through the port of Baltimore, this terminal being the best equipped on the Atlantic coast. The receiving yard has a capacity of 2,500 cars, the plan being to increase this capacity to 3,500 cars. The length of the pier over which the Neptune was loaded is 800 ft., permitting four vessels to load at the same time, two on each side. The dumping capacity of the pier averages 1,000 tons an hour on each side, or 2,000 tons an hour working at full capacity. The cars are pushed onto the pier by a locomotive, preparatory to being dumped, directly over pockets into which the coal is dropped and through which it enters shoots leading to the vessel. There are 25 of these pockets on each side of the pier. After a car is unloaded into the vessel, it proceeds by gravity to the extreme end of the pier, where it is switched to another gravity track leading to the yard. A force of 400 men is employed on the pier loading the vessels.

The Neptune is 520 ft. between perpendiculars, 65 ft. beam and 39 ft. 6 in. deep. Her propelling machinery consists of Westinghouse geared turbines.

Alterations to the Portland

THE steamer Portland, now undergoing repairs and alterations at the yard of the Great Lakes Engineering Works, at River Rouge, Mich., preparatory to service in the Atlantic coast trade, was originally the steamer A. B. Wolvin and with her sister ship the Wm. P. Palmer, was built at the Globe yard of the American Ship Building Co. in 1900, to the order of A. B. Wolvin, of Duluth. This order also included the tow barges Paraguay and Acunsion, built at the Lorain yards by the same company.

The Paraguay and Acunsion some years ago were converted into oil tankers and sent to the Atlantic coast. Last year the steamer Wm. P. Palmer was purchased by an eastern steamship company and also put in service on the Atlantic coast. The A. B. Wolvin under the name of the Portland will now follow the others into that service.

The A. B. Wolvin was originally built as a package freight steamer, but was later purchased by the Pittsburg Steamship Co. and did service in the ore and coal carrying trade. Two years ago the Port Huron & Duluth Steamship Co. bought the A. B. Wolvin from the Pittsburg Steamship Co. and renamed her the Portland, and put her again in the package freight business on their route between Port Huron and Duluth. At this time she was also fitted with passenger accommodations for summer business in the shape of two portable deckhouses containing a number of state rooms which were fitted over two of the hatches on the upper deck, and so fitted that they could be removed in the fall season. The requirements of the Port Huron & Duluth Steamship Co. having outgrown the facilities thus afforded in the steamer Portland and other vessels of their line, they cast about for a larger steamer to meet their requirements. This was found in the steamer Yale, belonging to Messrs. Boland & Cornelius, of Buffalo, and an arrangement was entered into by which the Portland was sold for service on the Atlantic coast, the Yale was purchased by the Port Huron & Duluth Steamship Co. from Messrs. Boland & Cornelius, and Messrs. Boland & Cornelius placed an order with the Great Lakes Engineering Works for a new bulk freight steamer to be built during the coming winter at the new yard of that company at Ashtabula, Ohio.

The alterations being made on the Portland for her new service are of a very extensive nature. The vessel was placed in dry dock at River Rouge last April and large repairs made to her hull. She will be fitted with a new tail shaft and stern tube, all brass-lined for salt water service.

The rudder of balanced type usual in lake practice will be replaced by the regular ocean type of rudder with pintles and gudgeons, built on the single plate principle with the upper stock constructed separately from the rudder and coupled to it by a vertical flange coupling. A new forged rudder post with gudgeon bearings for rudder pintles forged on will be fitted to the stern frame with scarphs top and bottom, connected by heavy turned bolts.

The engines and boilers have been very thoroughly overhauled, the boilers being fitted throughout with new tubes. A new surface condenser and air pump and centrifugal circulating pump have been installed, and all piping and connections in the engine room, water bottom, and on the boilers refitted suitable for salt water service.

Bunkers have been constructed to carry a fuel supply of 400 tons of

coal. All bulkheads in the steamer have been strongly re-enforced and the openings in the cargo hold bulkheads as used in lake practice, have been closed up, thus making three separate and distinct cargo holds.

The permanent midship deckhouse, and the portable houses as mentioned above for passengers' accommodations, have been entirely removed, and the hatches reconstructed so that the vessel when finished will have three cargo hatches 16 ft. by 20 ft. and one cargo hatch 24 ft. by 20 ft. These cargo hatches are of the same dimensions in the upper and lower decks. Steel plate coamings 24 in. high are fitted to the upper deck hatchways and heavy strong backs fitted for the support of the hatch covers.

The system of stanchioning the decks has also been largely re-arranged; fore and aft girders are carried along under the upper and lower decks at the side of the hatchways and stanchions of double channels back to back fitted at the hatchway corners, with a heavy portable stanchion on each side midway of the large hatch.

The spaces on the between decks alongside and aft of the engine room originally used for cargo space, are now utilized for bunkers and the after cargo gangways plated up. The other side gangways, three on each side of the ship, will have heavy forged iron frames fitted to them and new gangway doors fitted to open outward, as customary in Atlantic coast service.

All the original cargo handling machinery has been entirely removed and two masts fitted and a system of booms and winches installed for cargo handling. The foremost is of extra heavy construction and stepped on the tank top. There will be eight booms at this mast of five tons capacity, arranged on a table encircling the mast, also a heavy steel boom having a capacity to lift 30 tons set in a step aft of the foremast. At the main mast there will be six booms, also arranged on a table encircling the mast. The cargo-handling machinery will consist of four double drum Lidgerwood winches of five tons capacity and one single drum, double geared Lidgerwood winch of 30 tons capacity. The cargo-handling plant is being made to the designs of Theodore E. Ferris, of New York.

Wood ceiling closely fitted will be laid over the top of the water bottom extending to the top of the frame brackets and open sparred ceilings fitted on the face of the frames in the upper and lower holds to protect perishable cargoes against damage by moisture from the sides of the vessel. Perfect ventilation of the upper and lower holds is also provided by a number of ventilators fitted to the upper and lower decks so that the vessel may also be available for carrying fruit.

The steering gear has been rearranged for direct connection to rudder quadrant. A new hand-steering gear of the Robinson screw type will be installed. Arrangements have been made for carrying a large quantity of fresh water for boiler use in the double bottom, and tanks of 2,500 tons capacity installed to supply fresh water for use of the crew. The accommodations throughout the ship have been entirely remodeled to accommodate a crew of 26 men, including a wireless telegraph operator, and accommodations provided for purser in the texas adjoining the captain's accommodations, and also a large ice house built in the forecastle and large store rooms provided to carry ice and provisions for long ocean trips.

The vessel is fitted throughout with electric lights. The wiring and fixtures in the cargo holds have been entirely renewed, specially arranged to permit of loading or unloading at any time of the day or night. Provisions for the comfort of the crew have also been carefully attended to in the matter of baths and fresh water supplies for all departments and the vessel when completed and ready for service will be equal in equipment to the most modern vessels of her class.

The repairs and alterations are being carried out under the supervision of Alexander Hynd, of Cleveland, on behalf of the American Bureau of Shipping of New York, for classification in the *Record* of American and foreign shipping.

Western Dry Dock & Shipbuilding Co.'s Plant

THE plant of the Western Dry Dock & Ship Building Co., Ltd., at Port Arthur, Ont., practically a subsidiary of the American Ship Building Co., of Cleveland, has been reasonably busy since its new dry dock was completed a few weeks ago. The yard of course is not as yet complete, but it is expected to be a practical duplicate of the one at Lorain. The new dry dock was officially opened for business on April 15, when the Dunelm entered it for repairs. The dock is 700 ft. long, 94 ft. wide on top and 84 ft. wide at the bottom, with a 72-ft. gate. There are 16 ft. of water over the sill and 16 ft. 6 in. over the blocks. The photographs accompanying this article show the general character of the plant. The area of the yard is now 100 acres but will be extended as land is reclaimed. The punch shop is 155 ft. and 245 ft. with mold loft of the same dimensions. The machine shop, which has not yet been begun, will be 200 ft. by 60 ft. The boiler shop now under way is 90 ft. x 180 ft.

FIG. 1—THE FIRST LAUNCH IN THE NEW DRY DOCK.

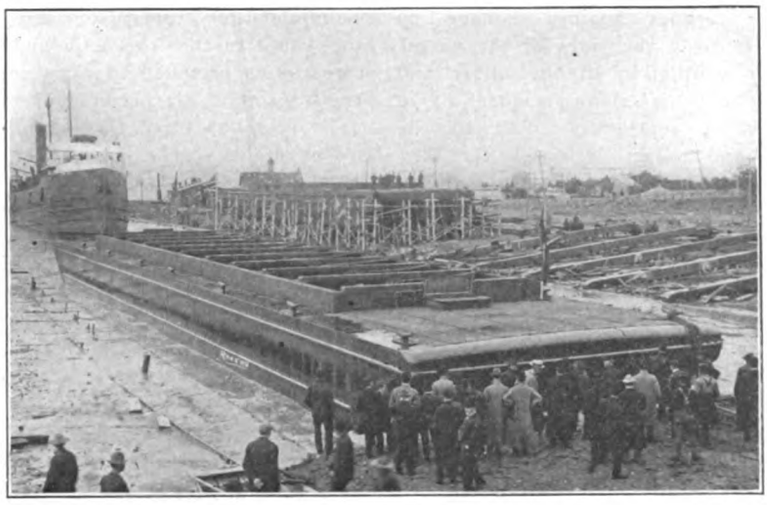


FIG. 2—SCOW IN DRY DOCK WITH STEAMER NEEPAWAH.

The first launching at the yard was a scow for the Great Lakes Dredge & Dock Co., 172 ft. long, 37 ft. beam and 13 ft. deep with 10 pockets. This scow is of 1,000 yds. capacity, and is of exceptionally strong construction. The hopper bulkheads are 5/8-in. plating and the balance 3/8-in. The doors are operated by power. The bulkheads are closely pitched to make the scow practically unsinkable. The partitions in the hopper are double plated or of box shape filled in with oak. The partitions when finished will be 7 in. thick. The coamings are stiffened with 12-in. oak timbers, which make the scow's upper works so strong that it would be impossible to make them unfair by any possible abuse. A duplicate of the scow is now under construction. Twenty pontoons composed of two cylinders, 30 ft. x 40 ft. diameter and 7½ lbs. plating were also constructed for the Great Lakes Dredge & Dock Co.

Referring to the illustrations, Fig. 1 shows the launching of the scow into the dry dock. Fig. 2 shows the scow in the dry dock after launching with the Neepawah at the other end of the dock. Fig. 3 shows the ice breaker James Whalen on the Whalen steel floating dry dock. This ice breaking tug was under repairs at the Whalen yard, but the workmen concluded that better dispatch could be had if the work was actually done at the dry dock plant and so the floating dock with its burden was towed to the ship yard. Sixteen plates were taken off the ice breaker. The rudder was repaired and a new wheel installed. Fig. 4 shows the Neepawah in dry dock before the launching, which gives a good idea of the size of the dry dock. Fig. 5 shows the punch shop and mold loft and the bow of the Dunelm in dry dock. Fig. 6 shows the Beaverton and Dunelm in the dry dock with plenty of room to spare. Fig. 7 shows a view looking toward the gate of the dry dock. Fig. 8 shows the Dunelm entering the dry dock on April 15, the first vessel to do so. Fig. 9 shows her on the keel blocks with the water running out through the damaged plates. Seventy-six plates were taken off the Dunelm and she would have been floated out by June 10, but the after cabin caught fire on June 7, which delayed the completion until June 22, when she left with a cargo of grain for Montreal. The Neepawah had a badly damaged bow and about 23 plates had to be replaced on her

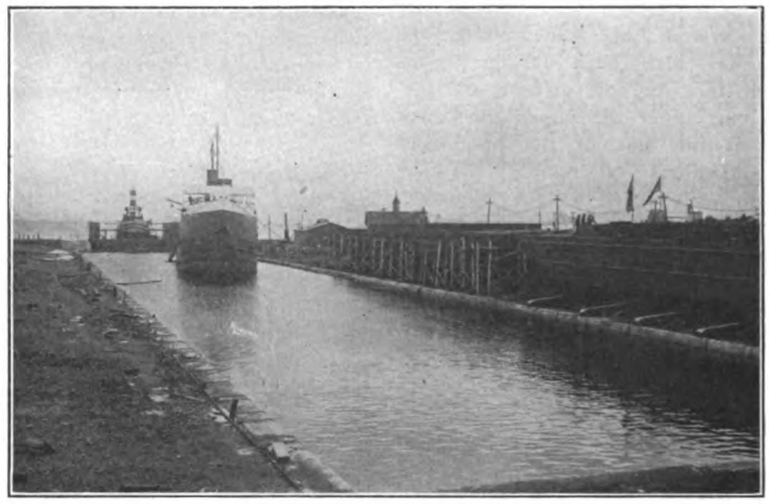


FIG. 1—SHOWING THE NEEPAWAH IN THE DRY DOCK BEFORE THE LAUNCHING, GIVING A GOOD IDEA OF THE DOCK'S SIZE.

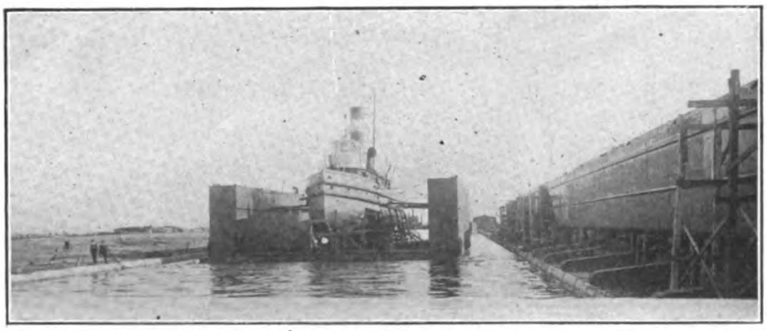


FIG. 3—ICE BREAKER JAMES WHALEN, IN THE WHALEN STEEL FLOATING DRY DOCK.

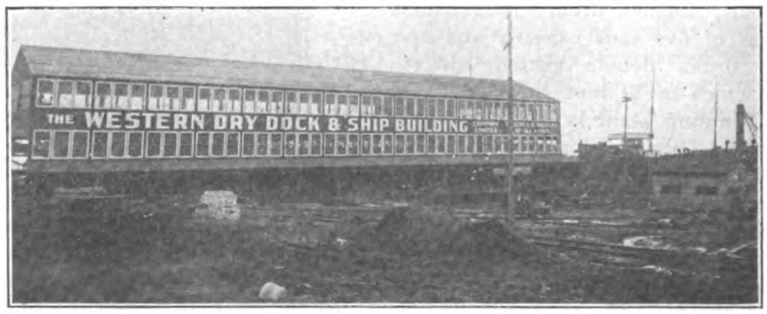


FIG. 5—PUNCH AND MOLD LOFT.

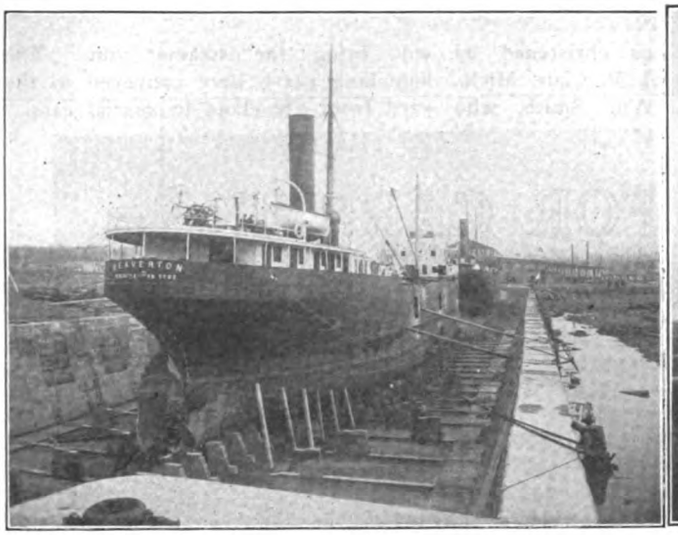


FIG. 6—STEAMERS BEAVERTON AND DUNELM IN DRY DOCK WITH PLENTY OF ROOM TO SPARE.

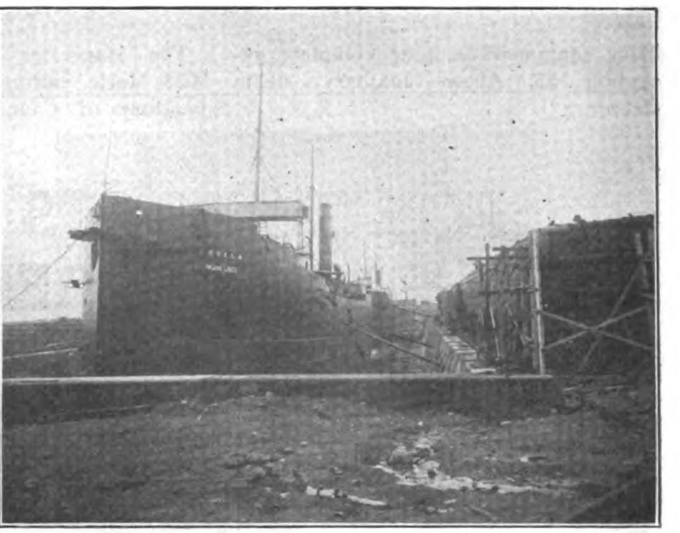


FIG. 7—LOOKING TOWARD THE GATE WITH SCOWS ON THE STOCKS.

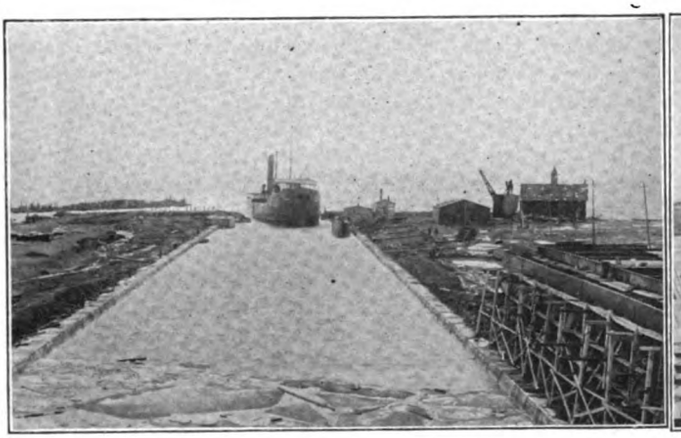


FIG. 8—THE DUNELM ENTERING THE DRY DOCK ON APRIL 15.

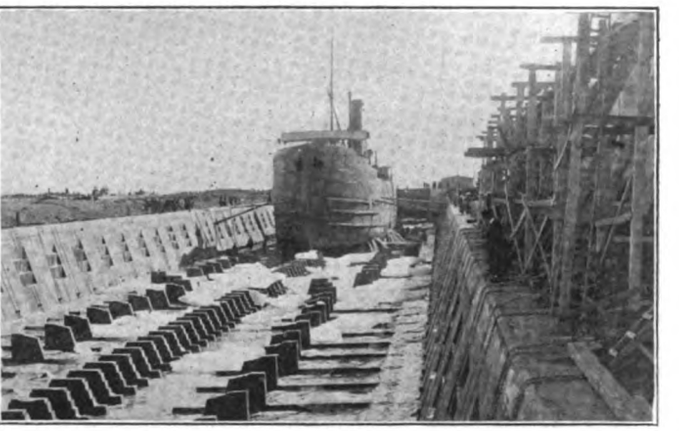


FIG. 9—THE DUNELM ON THE KEEL BLOCKS WITH THE WATER RUNNING THROUGH THE DAMAGED PLATES.

bottom. The Strathcona also came in for bottom repairs. Vessel owners in general express gratification at the establishment of this plant at Port Arthur, as it is proving a great convenience to them.

The "Inland Seas"

Capt. George P. McKay, treasurer of the Lake Carriers' Association, was browsing in his library a few days ago when he ran across a little volume which took him back to the days of long ago. The title page bore the inscription "Presented to George P. McKay by J. Disturnell on board the steamer Pewabic June 6, 1865." The title of the book is "The Great Lakes or Inland Seas of America, being a complete guide for the pleasure traveler and emigrant, with maps and embellishments." Capt. McKay then remembered that John Disturnell usually took a trip with him every year and compiled a little volume devoted to lake trade. The book carries quite a number of advertisements in the rear pages, which probably paid the cost of printing. The book opens with a description of the geography of the great lakes and then preceeds to deal with its commerce. Some of the statistics given as stupendous make very amusing reading these days. For instance, he states that the grand total of ore shipments from 1855 to 1864, a period of ten years, amounted to 852,683 tons, which was accounted a considerable commerce. It is considered nowadays a mighty poor pace if considerably more than a million tons are not moved in a week. He has assembled, however, a great deal of information about the various cities along the chain of lakes, all of which make interesting reading. For instance, the population of Buffalo is stated to be 81,000, Chicago 109,000, Cleveland 36,000, Detroit 45,000 and Milwaukee 45,000. The various passenger routes are also defined. The book closes with a list of the companies developing the iron and copper mines of the Lake Superior region. It is a very interesting little volume and is probably the first directory of the great lakes to be published.

Bulk Freighter Harvester Launched

The bulk freighter Harvester, building for the Wisconsin Steel Co., the lake end of the International Harvester Co., was launched from the Lorain yard of the American Ship Building Co. on July 15. The Harvester is built on the Isherwood system of construction and is the third bulk freighter to be constructed on this system on the great lakes. The new steamer is 545 ft. over all, 525 ft. keel, 58 ft. beam and 31 ft. deep. It is expected that she will carry 10,000 gross tons of ore, as her beam is two feet greater than the usual lake freighter of this length. She is the first steamer to be built for the Wisconsin Steel Co., and her forward quarters have been fitted somewhat elegantly for the convenience of guests. Her aux-

iliary equipment is quite complete, including an Akers auxiliary steam steerer.

The Harvester was christened by Miss Marie Smith, of St. Clair, Mich., daughter of Capt. Wm. Smith, who will bring the steamer out. The launching party were conveyed to the yard from Cleveland in special cars.

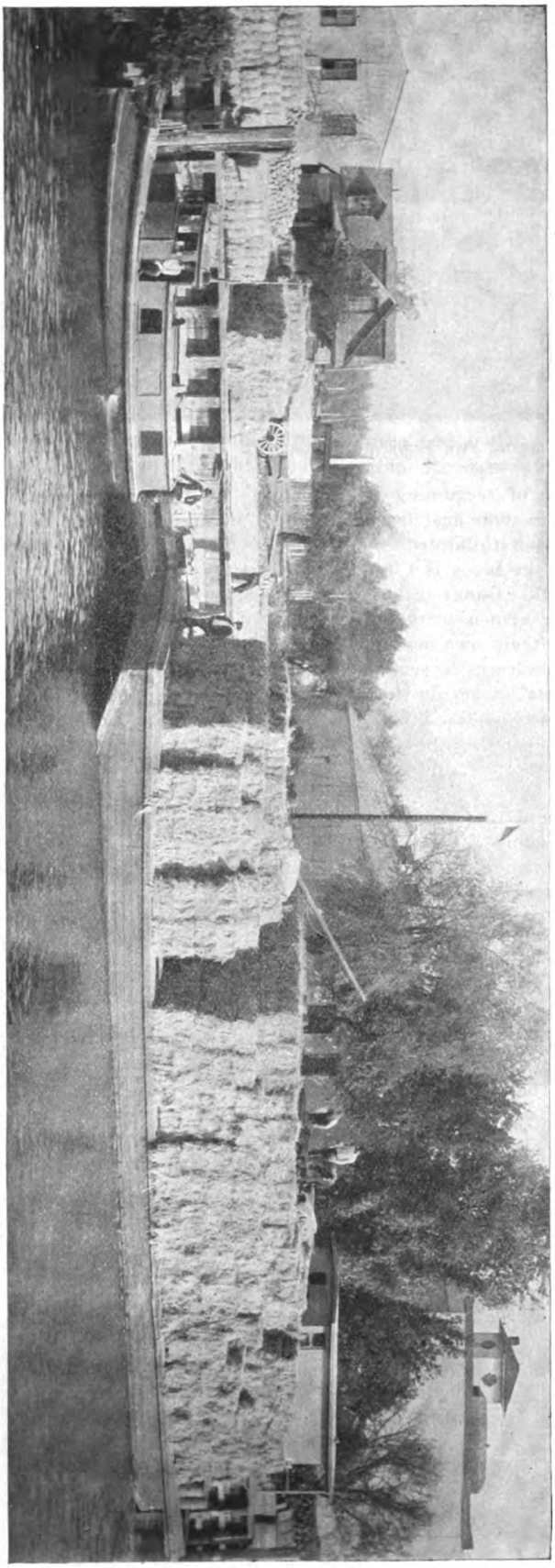
POWER BOATS FOR CARRYING FREIGHT

By Louis P. Zimmerman.

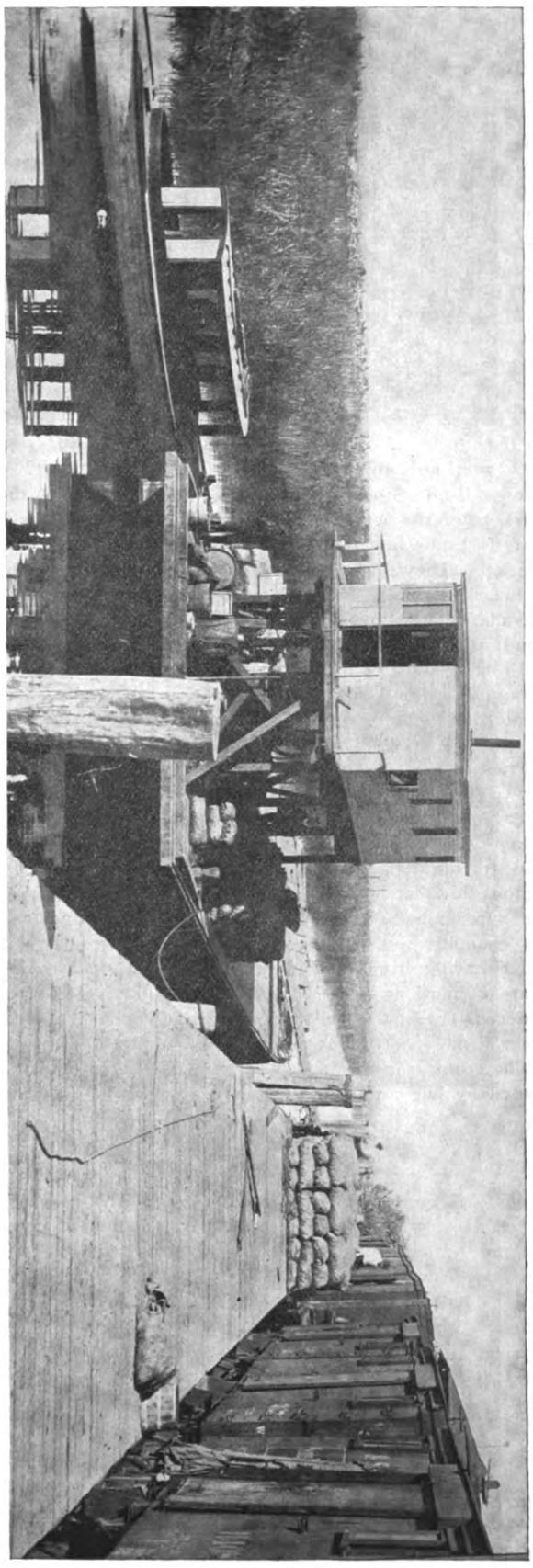
ABOUT a hundred miles inland from San Francisco on the San Joaquin river is the city of Stockton. It lies in the famous delta region, extending down through the center of the state between the San Joaquin and Sacramento rivers. The latter coming down from the north and the former having its rise in the Tulare lake region far to the south, drain practically the entire agricultural region lying between the coast range and the Sierra Nevada mountains. About half way between Sacramento and Stockton these rivers swing westerly and converge in the valley which opens out into San Francisco bay. The basin formed by these inland waterways comprises 30,000 square miles of the richest soil in the United States. With thousands of miles of waterways and countless islands, the only means of transportation in this agricultural Venice is by water. Steamers, barges and the commercial gas boat are the river carriers, of which spud boats, passenger boats, work boats and tow boats are four notable types that have been developed. While the present water course for commercial traffic between Stockton and San Francisco is over 90 miles in length, the type of craft used in this traffic is subject to the conditions prevailing in only 10 or 12 miles of the course. Vessels drawing more than 4 or 5 feet of water are compelled, in the midst of the busy commercial season, to await the action of the tides to float them over bars and shallows. This accounts in part for the extensive use of the small shallow-draught power boat. In round numbers this section has 500 work boats, 50 tow boats, 15 mail and passenger boats and 15 to 20 spud boats. Each is so entirely different in adaptation and design that descriptions will be taken up in turn. "Spud," according to Webster, comes from the Danish, spyd, spear, and means anything short and thick. Out on the west coast of the United States spud almost universally means potato, and spud boat means a potato carrier. These terms are in themselves contractions of spud buyers' boat and potato buyers' boat. This leads me down to facts and the beginning of my yarn.

Not only for the Irishman, but for the American as well, the humble spud is one of the essential items of diet. Stockton is the center of what is perhaps one of the greatest potato countries in the world. Down in the peat lands of the San Joaquin delta from 12,000 to 25,000 acres are devoted annually to potatoes, producing more than any other locality west of Cleveland. In the rich peat land they grow in large quantities and at a less cost than anywhere else in the west. Po-

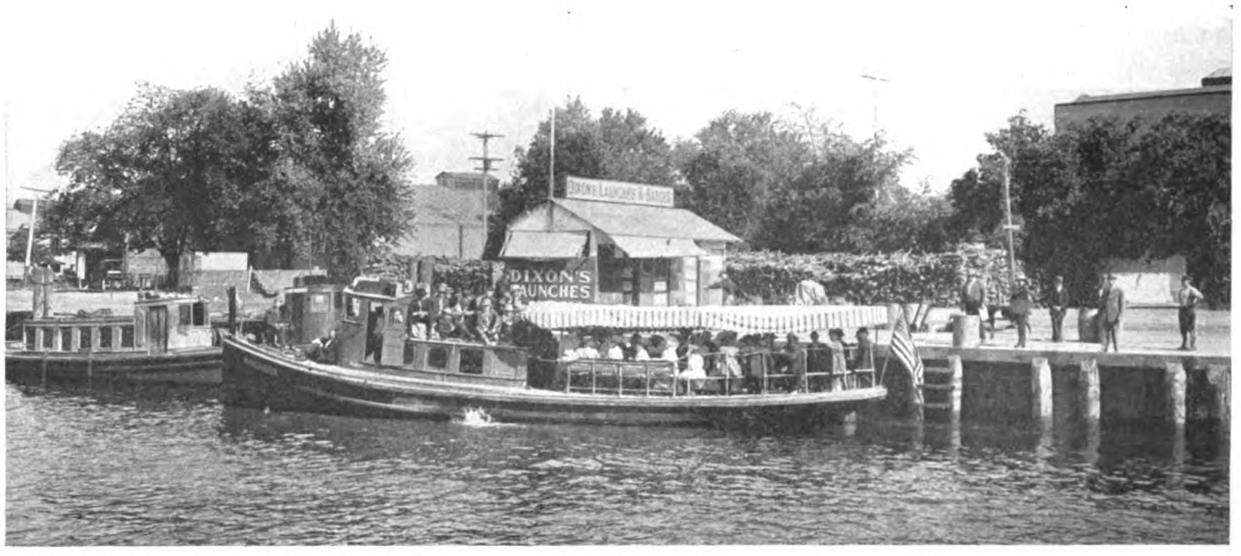
Lee Allen, a Farmer's Towboat of Large Power and Heavy Construction, Used to Tow Produce-Laden Barges Down the San Joaquin.



MONARCH, A SAN JOAQUIN TOWBOAT, LANDING A BARGE LOADED WITH BALED HAY AT ONE OF THE PORTS IN THE DELTA REGION.



WHERE CARTAGE IS CUT OUT AND BARGE MEETS RAIL IN THE DELTA REACHES OF THE SAN JOAQUIN.



WINEHAVEN, A PASSENGER BOAT, LEAVING THE DOCK AT STOCKTON.

tatoes from Stockton dominate the markets of the west. They go as far east as Louisiana and as far north as Alaska. They supply southern California, Arizona, New Mexico and Nevada. They are, therefore, far beyond a local proposition in commercial importance. Barley, beans, asparagus, grapes and hay are other staple products handled commercially by the gas craft.

Practically all of the potato crop is grown on reclaimed land, where the river and flood waters are kept off by dykes. These big reclaimed river bottom tracts are more fertile than the famous low lands of the Nile. They are surrounded on all sides by natural channels and "dredger cuts," the latter having been opened up through years of hard and costly work. These waterways are the thoroughfares and the railroads of the delta lands.

The major part of this land is owned by big companies who are able to finance the work of reclaiming it. In turn it is leased to individual farmers and it is again "potato-farmed" on contract. Nearly all the labor is Chinese, Japanese or Turk. Gangs of several hundreds of these men work under a gang boss of their own nationality. The man who leases a section of land from the big owner in turn makes contracts with these labor bosses. The lessee furnishes the seed and the boss the labor. Profits are shared half and half.

Stockton is the head of river navigation in the delta region and is some 15 miles above the center of the potato field. Nearly every commission house located in the nearby towns has a buyer at Stockton. During the potato buying season, which lasts some 12 weeks, from September to December, the spud buyers are on the "road" every day, all day, in their spud boats to gather in the choice of the year's crop. During the buying season a miniature Wall street excitement is prevalent in the potato district. Some 20 buyers in as many boats are the active agents between the growers and the commission houses. In the middle of the season time means money and speed is a prime requisite.

Spud boats are, consequently, speed boats, with the added factor of absolute reliability, and the ability to run for 20 hours a day for three months, if necessary, without delay. During the season nearly all the buyers tie up in the evening at Orwood, a station, 15 miles down the river from Stockton. The 8 a. m. local express, each morning, bears a squad of buyers to their boats at Orwood. All have an even start. All get off together, barring accidents. From then on, however, the race is hot, and the best boat and the best crew wins, just as surely as in the hottest race for a commodore's cup. The price is neither a gold nor a silver trophy, but real

HAROLD W. TAKING A CARGO OF ASPARAGUS FOR A QUICK TRIP TO CATCH THE HIGHEST MARKET.

gold eagles, for a breakdown or a beating means that the other fellow gets there first and grabs the pick of the crop—and gets the top of the market price. Day-in-and-day-out competition of this kind has developed a type of commercial spud boat that is noted for speed and reliability.

Nearly every boat bears the name of its owner or the firm it represents, and you see, Frank A. Guersney, Potatoes, and Weyl-Zuckerman Co., Hunt-Hatch Co., etc. When the buyer lands, he needs no further introduction to the boss in charge.

Spud boats range in speed from 10 to 20 miles per hour and from 25 to 35 or 40 feet in length. All models of hulls and all kinds of engines are used. In selecting an engine for a spud boat the points considered are reliability, power and weight, in the order given. A good price is no objection, for a day in the shop in the midst of the season or a mile an hour slower than the other fellow, may mean the loss of many times the cost the engine in a single day. Many kinds of comparatively light motors are being used. This particular field offers a splendid opportunity for some engine manufacturer to demonstrate that his high-speed stock engine will deliver the goods through hard, continuous service.

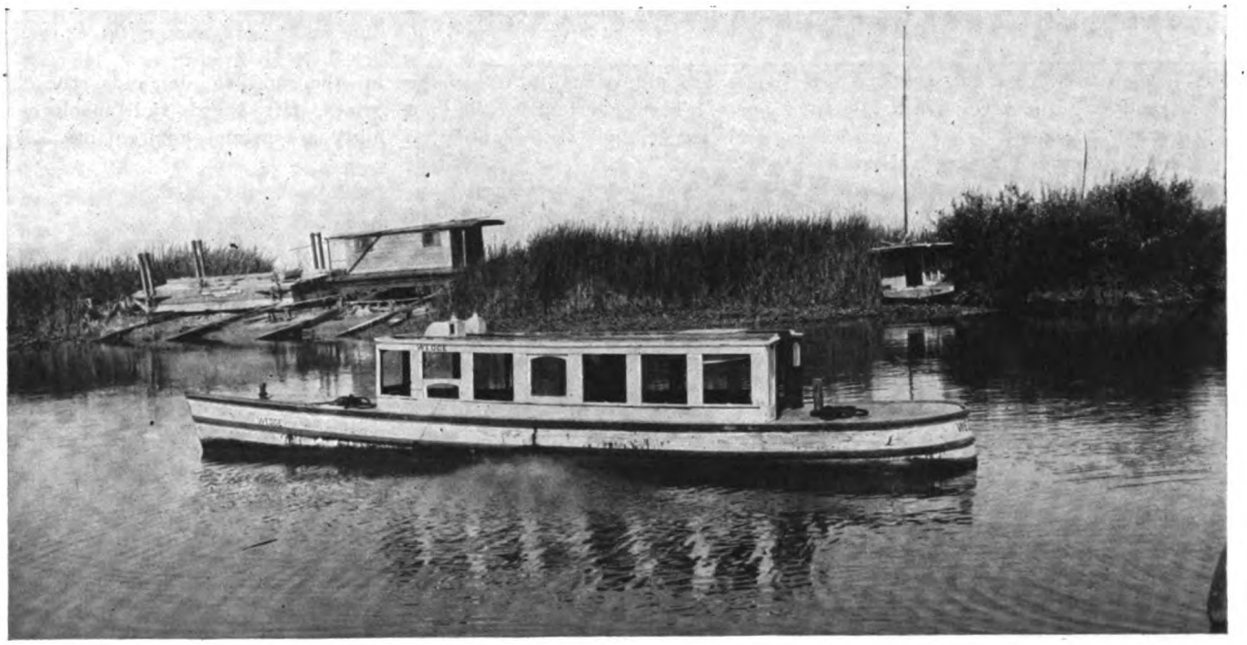
Nearly all the spud boats are built by Stephens Bros. and John Grant, of Stockton. Stephens Bros. have developed a hull for this class of work, with a very sharp waterline forward and with a slight flare above water to take care of the rough stuff. The deck lines forward are full and generally the forward quarter is decked over to protect the motor. Torpedo sterns are the favorites. A cabin is set amidships and is provided with accommodations for two or three men. As the buyer spends nearly all day, every day for three months, aboard his boat, all conveniences possible are provided.

Dunbar Hanson, owned by Dunbar Hanson, and built by Stephens Bros., is a typical spud boat. She measures 32 feet by 5½ feet and does 14¾ miles per hour with a 30-horsepower Scripps motor. Her hull is built of ⅝-in. white cedar over 1-in. square oak ribs. Her water lines forward are very sharp and she has a torpedo stern. A cabin accommodating two men is finished in natural oak and is fitted with auto engine controls, toilet and handy seats. Dunbar Hanson is in service, on an average, six hours a day, every day for six months in the year. Complete, Dunbar Hanson cost $1,900 and her reliability record is exceptional.

The transportation of produce, not buyers, is next. For this service a very different class of commercial boat is used. While some of the spud crop is moved by river steamers, the majority is handled on barges and the barges are towed for the most part by gas tow boats. Barges used on the San Joaquin river are built of pine, of standard plank construction, in sizes 80 by 24 ft. and 60 by 20 ft., carrying about 2,000 and 1,000 sacks of spuds, or 240,000 and 120,000 lbs., respectively.

All kinds and designs of boats are used for towing, but they are broadly classed as tow boats and work boats. Empire, owned by the Empire Navigation Co., and built by Stephens Bros., cost $8,000, and it is one of the most powerful as well as one of the best all around boats on the river. Empire is powered with a 100-H. P. San Francisco Standard, turning a 56-in. wheel, which drives her 10 miles an hour. She is 53 ft. long, has 13 ft. of beam and draws 6 ft. of water. Except for a stem of iron bark, 7 in. by 22 in., the hull is built of pine. The keel is 10 in. by 12 in., fitted with sister keelsons, each 8 in. by 12 in. The engine bed is 12 in. by 12 in. and 20 ft. long. All frames are 8 by 8-in. pine and the planking inside and out is 2-in. pine, topped with a garboard strake, 3 in. by 14 in. A feature of the engine house are the walls, built of 4-in. timbers, bolted through and through. Just forward of the engine room is the pilot house with all controls. Aft is a cock pit for carrying freight. Empire carries 300 gal. of distillate for fuel. Steering gear and quadrant for the 6-in. ironwood rudder are on deck aft.

On the river are 50 of these gasoline tow boats, all equipped for one man operation and all doing the work of steam tugs with their crews of three and four men. The gas engineer, on the other hand, is pilot, captain, deck hand and cook, all in



A TYPICAL SPUD BUYER'S BOAT WITH EXTRA LARGE CABIN ACCOMMODATIONS BUILT FOR FAST SERVICE ALONG THE SAN JOAQUIN VALLEY.

EMPIRE, EQUIPPED WITH A 100-HORSEPOWER 'FRISCO STANDARD, IS A SPLENDID EXAMPLE OF THE GASOLINE TOWBOAT IN USE ON THE SAN JOAQUIN RIVER.

one. It is estimated that the produce moved annually by the river craft totals $30,000,000.

"On the river every man has a boat and every boat a use," is the way an old timer summed up the situation, when I asked him why they did not have a power boat club. To look at the hundreds of work boats of every size and description, doing all kinds of work, you readily conclude that every boat has a use other than for pleasure In the delta region of the San Joaquin, cartage is cut out. Barge and boat meet the freight car and the consumer. The average haul is 75 miles and the cost of hauling grain, hay, lumber and produce varies from 1 1/10 to 1½ cents per ton mile.

One of the photos shows Harold W., a typical asparagus boat, piled high with cases of canned asparagus from the asparagus fields and canneries of the delta region. The asparagus boats are almost as noted as the spud boats. They are built with good lines and speed and are adapted to carry large quantities of asparagus boxes, presenting large bulk and comparatively little weight. As the first in the market demands the choice prices, fair speed and absolute reliability are prime requirements.

EMPRESS, A 90-FOOT MAIL AND PASSENGER BOAT, WHICH, WITH HER SISTER SHIP DUCHESS, MAINTAINS A DAILY SCHEDULE OF 120 MILES BETWEEN SACRAMENTO AND STOCKTON.

DELI-B, ONE OF SAN JOAQUIN'S BUSINESS BOATS, WHICH CARRIES MAIL, PASSENGERS AND PACKAGE FREIGHT.

By a work boat on the San Joaquin is meant a smaller and less substantially built type of tow boat with considerably less power and often much greater speed. Generally space is provided for freight. All work boats are one-man control. The work they do is almost legion. Otter, used by the Ringe Land & Navigation Co., of Stockton, is one of these all around craft. Her engine is a 25-H. P. Imperial, placed approximately amidships and turns a 32-in. heavy towing wheel. Her speed is nine miles per hour. Complete, Otter cost $2,600, divided equally between the engine and hull. Built on a compromise model, her keel is 4 by 6-in. oak, with frames, 1¾ in. square, and she is planked with ⅞-in. white cedar. Pilot house, deck and engine controls enable one man

to handle her in any situation from any part of the boat.

Over a dozen passenger and mail boats are in service in and near Stockton, and between the islands of the delta region and Sacramento. They range in size from 90 ft. over all and a 16-ft. beam with a 150-H. P. engine to a 36-footer, with 10-H. P. Nearly all passenger boats carry the mails as well as passengers between the various island towns. Dell B, owned and operated by Wm. Colberg, runs through the islands on a schedule that calls for 14 hours of running out of every 24. Landings are made at any point by the simple process of running the bow into the bank. A vigorous backing pulls her off with no harm done. On busy days this is repeated every 10 minutes for hours at a time. Dell B is 53 ft. long, with 10 ft. beam, and has a seating capacity for 35 people, but generally carries from 50 to 60 passengers. The hull lines run flat to within 8 or 10 ft. of the bow, where they are rapidly drawn into the stem, completing her compromise model and giving great stability with fair speed and shallow draught. She averages 10½ miles an hour. The engine, a 50-H. P. Samson is placed below and just aft of the pilot house, where all engine controls are centered. Aft of the engine is the passengers' cabin fitted with long side seats. On the after deck is a circular latticed seat for 20 passengers. Simply finished in stained pine and oak, Dell B and Frank C., twin ships, make very comfortable and popular carriers on their daily trips of 100 miles on the river routes.

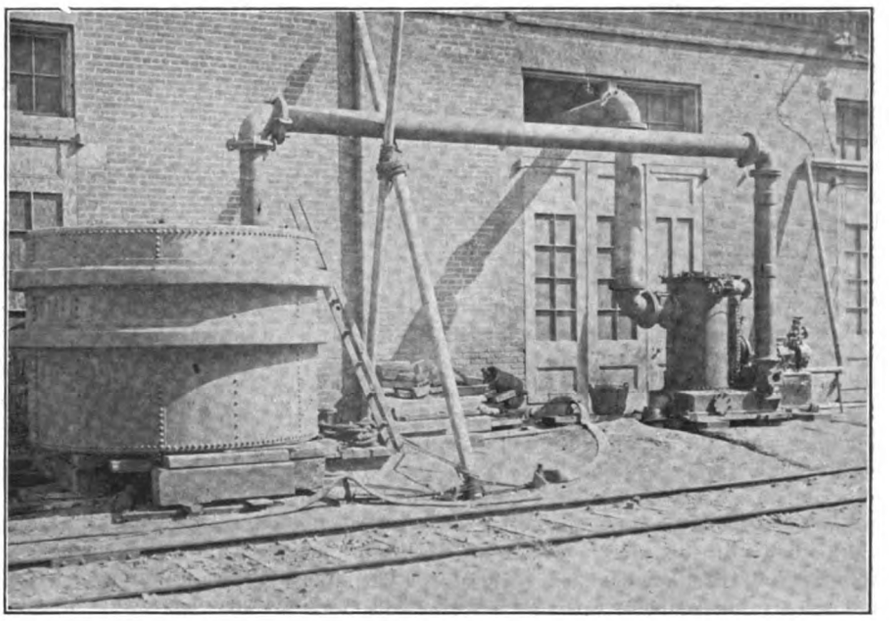
Three of the most remarkable mail and passenger boats are the Princess, Empress and Duchess, operated by Lauritzen Bros., of Antioch, Cal. Princess is 52 ft. long, 9 ft. beam, and is powered with an 80-H. P. Atlas engine. She maintains the mail and passenger service between Antioch and Rio Vista, Cal., making two round trips daily—a minimum mileage of 80 miles. The sister boats, Empress and Duchess, are on the mail and passenger service between Stockton and Sacramento, a minimum mileage of 120 miles. Both boats have for power a single, 120-H. P. Atlas engine. Their schedule calls for 11 hours of running time, an average of 10 9 miles per hr., including landings.

Perhaps nowhere in the United States has the commercial power boat developed to such an extent as on the Pacific coast. The enormous tonnage handled by the power craft on the sunset slope is almost appalling. In no less degree than on the coast is the use of the power boat in the farming section of the San Joaquin delta district, truly remarkable. Not only in the carrying of merchandise into the farming districts but in the marketing of the products of the farm, as well as in solving the farmers' transportation problems, the gasoline power boat has added to the farmers' income and has been an important factor in opening up and inducing the settlement of large areas of otherwise nonproductive country.

The Harker System of Fire Extinguishing and Fumigation

By G. W. Dickie

There has lately been carried out a series of interesting experiments at Mare Island navy yard with the Harker fire extinguisher and fumigator. These experiments were conducted by a board of naval officers, appointed to test the merits of the machine made by the Harker Fire Extinguisher & Fumigator Co., Ltd, under patents granted to Dr. George Harker of Sydney. As this system is of great scientific interest and should be especially applicable to marine work, both naval and merchant, a short description of it should be of interest to the readers of THE MARINE REVIEW.



HARKER FIRE EXTINGUISHER AND FUMIGATOR.

The principle involved in the Harker system is simple enough. In an ordinary fire the supply of oxygen necessary for combustion is obtained from the atmosphere, which contains 21 per cent of that gas. If the proportion of oxygen in the air supplied to the fire be reduced combustion takes place more slowly, if reduced to the extent of 14 or 15 per cent of the air supplied the flames of the fire are extinguished and with a further reduction combustion is no longer possible.

In an ordinary marine or land steam boiler, combustion takes place in the furnace when a large proportion of the oxygen in the air combines with the carbon in the fuel and a gas is produced which contains only about 8 to 10 per cent of oxygen. It is evident, therefore, that the flue gases taken from the uptake of a steam boiler are of such a character that fire cannot exist where such gas takes the place of the atmospheric air. The quantity of this gas available, on steamships, for instance, is practically unlimited, as every ton of coal consumed produces, at ordinary temperature and pressure, about 400,000 cu. ft. Animal life cannot exist for any length of time in an atmosphere containing less than 10 per cent of oxygen, especially if carbonic acid gas be present and this property of flue gas is also utilized for the destruction of rats and other vermin on board ship. Another advantage in using ordinary flue gas is that it has no injurious effect whatever on steel or wood work, nor does it destroy the most delicate furnishings or drapings. The flue gas from oil fuel is just as effective as that from coal and the exhaust gases from internal combustion engines are equally serviceable.

The Harker machine, as tested at Mare Island navy yard, is shown in

the illustration. The flue gases were drawn from the uptake of a pair of boilers, burning oil, through a pipe shown as passing out over the door transom of the boiler house. The machine, shown in front of the boiler house door, consists of a turbine or motor-driven blower and a washer for purifying the gas. A large tank, as shown in the illustration, was used to demonstrate the effectiveness of the machine. A quantity of crude oil was placed in the tank and set on fire and, when burning with great force, the machine was started drawing flue gas from the uptake of the boilers through the washers. This gas was blown into the tank over the burning oil by the fan and the flames were almost instantly extinguished. It was also shown that the gas generated from the hot oil could not be exploded with the flue gas for an atmosphere. An air valve is provided in connection with the machine so that pure air can be blown into any space to clear away the flue gas after it has accomplished the purpose for which it was introduced.

For preventing fire or explosion on ship board, where the cargo is subject to spontaneous combustion as with certain kinds of coal or lime, the Harker system should be very effective, as the hold can be filled with this gas as easily as a ballast tank can be filled with water. The valve controlling the hold to be filled is opened and the valves for the other holds shut; the water supply valve to the washer is opened and the fan started drawing flue gas from the uptake through the washer and forcing it into the hold, where it gradually displaces the air, filling up all the holes and crevices in the body of the cargo. When the hold is full, the hatches are secured and fire is impossible. Coal bunkers, that are not being worked, can be secured against fire in the same way. Where oil fuel is used, the space above the oil in the tanks can be kept charged with this gas, ventilating pipes are then unnecessary and danger is entirely eliminated. This same treatment applies to tank ships carrying oil in bulk.

Where large storage tanks for crude oil are in use, and many are installed now other than where the oil is produced, disastrous fires are not an uncommon occurrence. The installation of this system, whereas oil was drawn from the tanks if instead of admitting air, the space above the oil was kept charged with flue gas, the burning of a tank would be impossible.

In the tests of this system carried out at the Mare Island navy yard, under the direction of a board consisting of an engineer officer, a naval constructor, the yard chemist and the doctor in charge of the naval hospital, besides fire being extinguished and explosion of oil vapor prevented, rats were destroyed in a few minutes and it was further shown that disease germs were killed by charging the gas with formaldehyde vapor. For this purpose 180 cubic centimeters of formalin were used for every thousand cubic foot of flue gas. There is a special arrangement provided on the machine for introducing such powerful germicides with the gas as formalin, carbon bisulphide, etc.

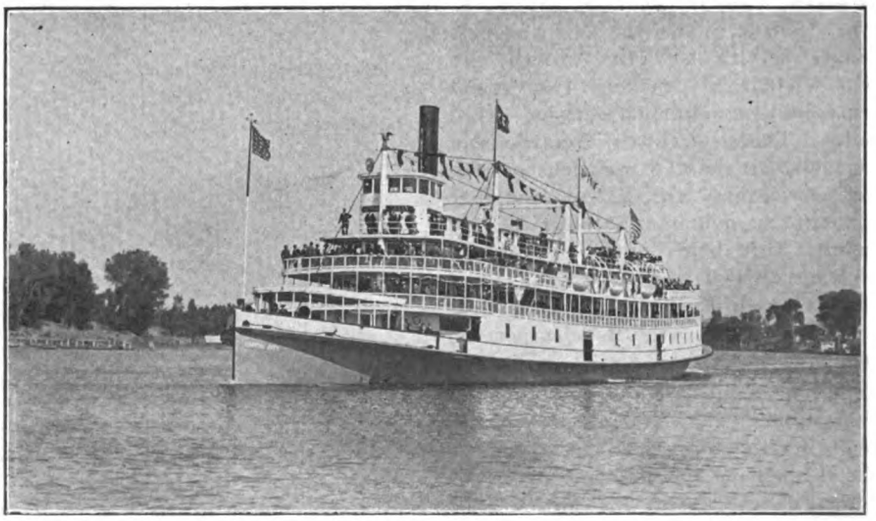
A government trial of the Harker system took place in Sydney harbor on May 4 of this year and, like the one at Mare Island navy yard, was entirely successful. Rats, fleas, bugs and cockroaches were rapidly killed in the hold of a vessel into which the gas was blown. For the destruction of cockroaches, which are hard to kill, carbon bisulphide was used with the flue gas as described above, and they were dead in fourteen minutes. As a result of the above trials, the government of Australia has authorized the use of this system for fumigation in the commonwealth.

The principles involved in this machine are undoubtedly correct and the process has passed the experimental stage. Its simplicity and cheapness should at once make it interesting to all owners of property who need such a safeguard from fire. I have been exceedingly interested in the trials of this system, as it offers to fill a long-felt want, furnishing, as it does, the means of fire extinguishing without the destruction involved in the use of water, which often means the sinking of a ship and the loss of all goods on board in order that the hull might be saved.

The Steamer Capital City

THE steamer Capital City, owned and operated by California Transportation Co., plies between San Francisco and Sacramento. The steamer is named in honor of the city of Sacramento, the capital of California. The keel was laid December, 1909. Length over all, 258 ft.; beam over guards, 51 ft. 9 in.; depth of hold, 9 ft. 6 in. The hull is divided into nine watertight compartments by cross steel bulkheads. The engines are cross compound type cylinders 25 and 43½ in diameter by 9-ft. stroke. The boilers are of the return tubular type.

The Capital City has wide promenade and shade decks. The interior is elegantly finished, and luxurious accommodations afforded passengers makes travel by water between San Francisco and Sacramento a pleasure. The gentlemen's smoking room, main dining saloon and social hall, which are located on the saloon deck, are all paneled in mahogany, white cedar and birch. The social hall is lighted from overhead by a magnificent art glass dome 32 ft. in length; a mahogany staircase leads from the lobby on the saloon deck to the observation room on the deck above. This observation room is abundantly lighted by large plate glass windows and is



THE STEAMER CAPITAL CITY.

CALIFORNIA TRANSPORTATION COMPANY'S STEAMER "CAPITAL CITY."

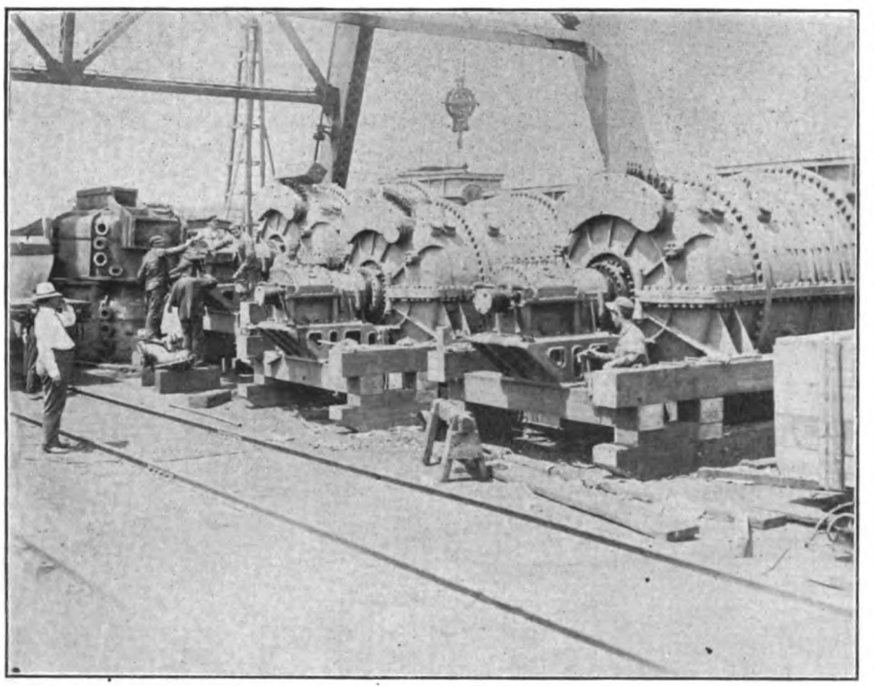
paneled in mahogany and cedar to correspond with the dining room. Every stateroom is served with hot and cold running water and there are a number of large rooms en suite with private bath. The lobby is on the saloon deck and directly across from the office is located the barber shop with bath connections.

Curtis Turbines for Italian Scout Cruisers

The Fore River Shipbuilding Co., at Quincy, Mass., has just shipped from their works to the Officine Meccaniche, Naples, Italy, three of six Curtis turbines for the Italian cruisers Nino Bixio and Marsala. These turbines represent the very highest development of marine engineering, the type of propulsive machinery for these vessels having been given the most searching study by the Italian naval authorities.

Each vessel has three turbines, each driving a single screw, one on the center line of the ship and two at the sides as in an ordinary twin screw arrangement. The turbines at 450 revolutions will develop 8,000 h. p. each and 22,500 h. p. will give the vessels a speed of 28 knots.

The turbines are technically called 80-in. 16-stage turbines, that is, the mean diameter of the rotating drum is 80 in., and the steam is expanded 16 times, from boiler to condenser. The turbines are extremely simple in construction, no part being in motion except the one main revolving shaft with its wheels and buckets inside the casing. On the shaft are a series of wheels and a drum carrying at the periphery rows of buckets on which the steam impinges as it passes through from boiler to the condenser. Between each row of revolving buckets are stationary guide buckets rigidly fixed to the interior of the casing for the purpose of guiding and giving the proper direction to the steam before it impinges on the revolving blades. There are also a series of nozzles disposed between the various stages with openings so designed as to control the velocity and pressures of the steam in its flow from stage to stage, in



CURTIS TURBINES FOR ITALIAN SCOUT CRUISERS RECENTLY SHIPPED BY THE FORE RIVER SHIP BUILDING CO. TO ITALY.

such manner that the entire energy of the steam is gradually utilized and absorbed in turning effort as it passes through the turbine from end to end.

For reversing there are wheels with several rows of buckets and nozzles formed exactly as those just described but with the angle of buckets in the opposite direction, all within the same casing. These wheels are located at the exhaust end of the turbine and, therefore, when going ahead simply revolve idly in vacuum. When backing, steam is shut off from the ahead end and turned into the astern end, passing through these reverse buckets, reversing the motion, the turbine turning in the opposite direction, and the ahead wheels and drum revolving idly in vacuum.

The thrust of the propeller is taken directly by steam pressure on the end of the drum itself, thus practically eliminating friction. There is a thrust bearing formed directly on the end of the turbine casing to take up the inequalities of thrust, the entire design resulting in one complete self-contained structure.

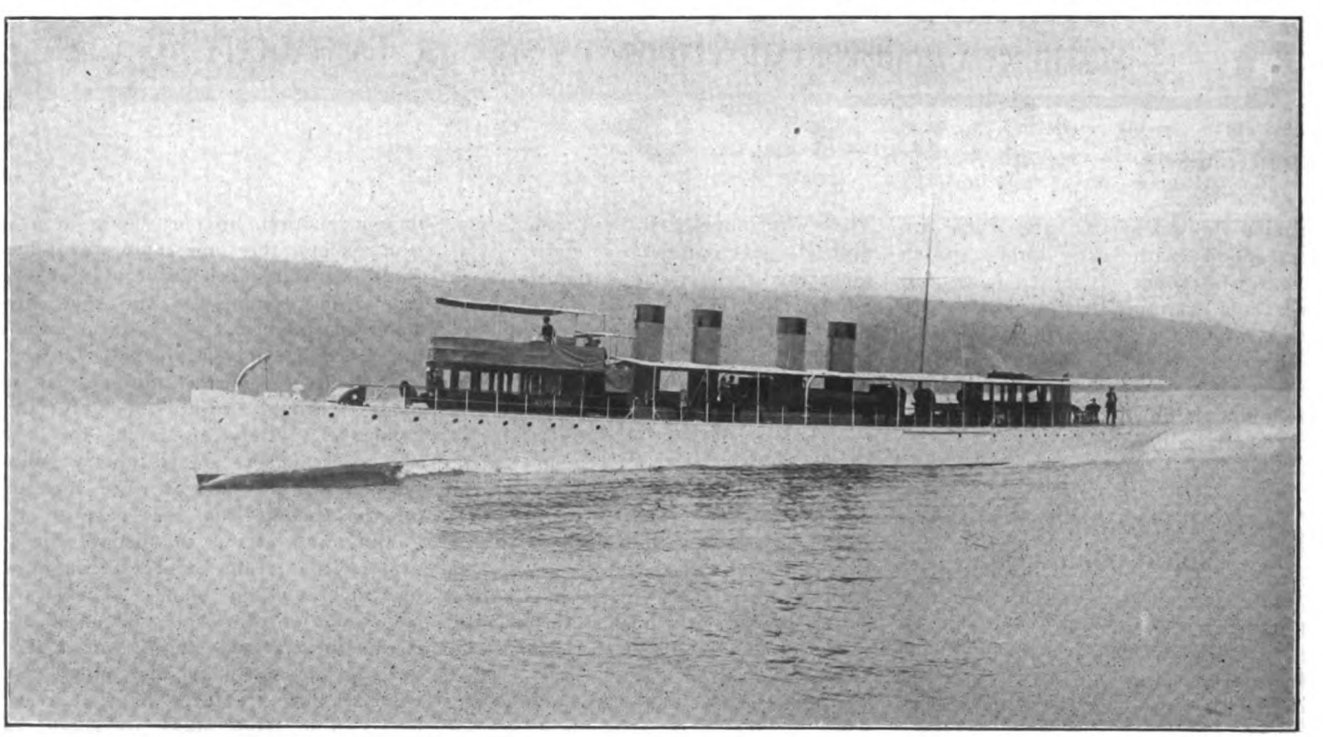
Each turbine when completed was connected to the test boiler and condenser, run and tested in the shop before shipment.

The turbines were fitted complete with valves, piping and fitting for operating, and for drainage and lubricating, etc.

The total weight of each turbine was 100,000 lb., the outside dimensions being 21 ft. 6 in. long and 9 ft. 4 in. in width.

Steam Yacht Sovereign

The new 165-ft. twin-screw Tobin bronze and steel steam yacht, designed by Charles L. Seabury, and built by the Gas Engine & Power Co., and Charles L. Seabury & Co., Consolidated, Morris Heights, New York city, for M. C. D. Borden, New York Yacht Club, is now in commission and is making daily runs with owner aboard between Oceanic, N. J., and the Battery. A speed of 35 miles per hour was guaranteed. This meant 35 miles in 60 minutes, and not at the rate of 35 miles per hour for 1 mile. On repeated trial trips, 38 to 39 miles per hour was attained. The steam pressure allowed is 325 lb., but from 275 to 280 lb. was the highest carried. The Sovereign can easily be distinguished by her four smokestacks. There is a large dining saloon in forward deckhouse, and social hall in



STEAM YACHT SOVEREIGN, NOW ATTRACTING CONSIDERABLE ATTENTION IN NEW YORK HARBOR.

after house, while staterooms and bath rooms for owner and guests are below decks aft. Officers' and crew's quarters are forward. Steam is generated by Seabury patent safety water-tube boilers, while the two four-cylinder, triple-expansion engines are also of the Seabury type, and develop about 2,500 h. p. each.

EQUIPMENT OF THE GAS POWER YACHT PROGRESS

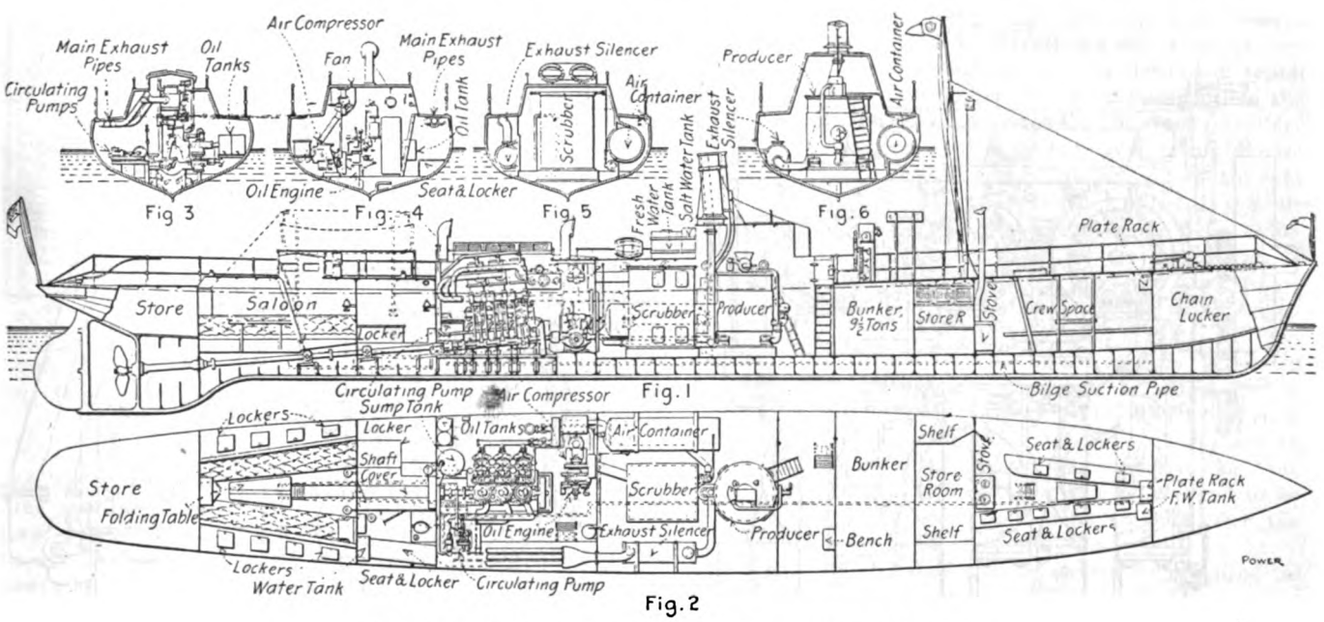
FOR some time past the possibility of using internal-combustion engines for ship propulsion has been attracting the attention of marine engineers in all parts of the world. The simplest solution of the problem consists, no doubt, in adopting oil as the fuel to be used, since this gets rid at one stroke of all difficulties connected with the producer; but though this is the simplest method of adapting the internal-combustion engine to marine purposes, it cannot be considered as generally applicable, because the cost of oil fuel in many parts of the world is quite prohibitive. It seems certain, therefore, that if the ship of the future is to be fitted with internal-combustion engines, the plant must be one capable of using gas derived from ordinary coal. This being so, the marine gas-power plant herein described is of great interest.

The original designs were got out about three years ago, and appeared to give such promise that a syndicate was formed to build an engine and install it in a small boat, with a view to having the efficiency of the system tested and its weak points eliminated by the light of actual experience. In essentials the system remains the same as originally designed, but, as is practically always the case with a departure from established practice, various difficulties connected with the subsidiary details arose and have had to be overcome by a process of trial and error.

The engine is a double-acting producer gas engine, with three cylinders 8¼ in. in diameter by 9-in. stroke, driving the propeller direct without the interposition of any form of gearing. It operates on the two-stroke cycle and develops 100 indicated horsepower when running at 200 revolutions per minute. The gas is supplied by a suction producer which has been worked with anthracite, with coke, and with coalite; the latter is said to have proved very satisfactory, there being less clinker formed than with coke.

The engine, with its producer and auxiliaries, was fitted on board an old torpedo boat originally driven by steam engines. The original propeller and propeller shaft was retained, but it was necessary to rebore the stern post, as the center of the gas engine crank shaft was at a higher level than that of the original engines. The space available around the engine was naturally somewhat cramped in view of the fact that the installation to be tested was an experimental one, with which it may always safely be assumed that certain modifications in details will be proved by experience to be necessary or advisable. On the other hand, the producer, though large enough for an engine of more than double the output, required much less space than was occupied by the original boiler.

The arrangement of the plant as finally fitted on board is well shown in Figs. 1 to 6. The producer and the scrubber stand in the stokehold, the air reservoir used in reversing the engines being fitted in on the port side of the scrubber, while the exhause-silencer is on the starboard side, as shown in Figs. 2, 5 and 6. This exhaust-silencer, it should be added, has proved very efficient, the noise, with the engines running, being hardly greater than with steam.



FIGS. 1 TO 6—SECTION OF THE GAS POWER YACHT PROGRESS.

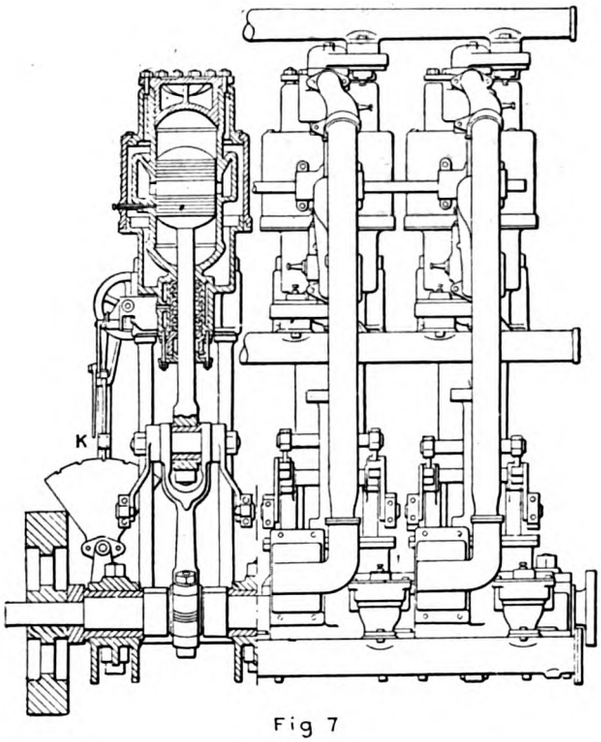


Fig 7

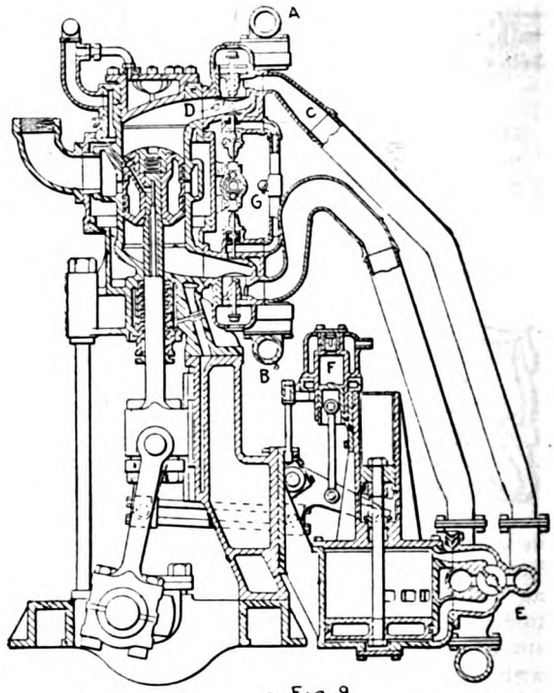


Fig 9

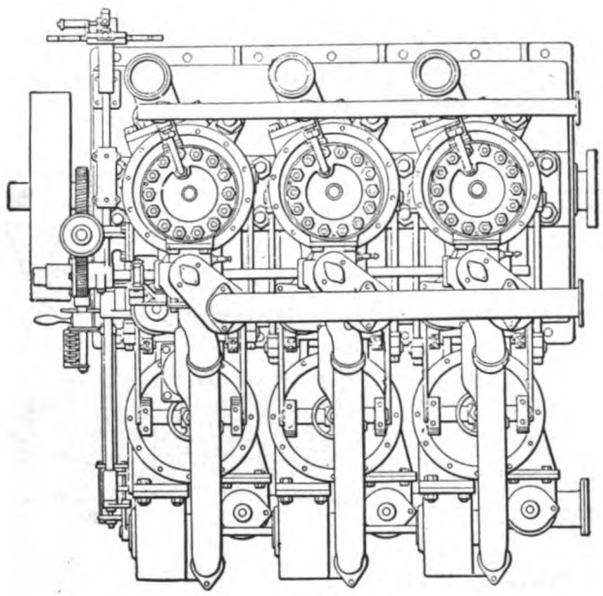


Fig 8

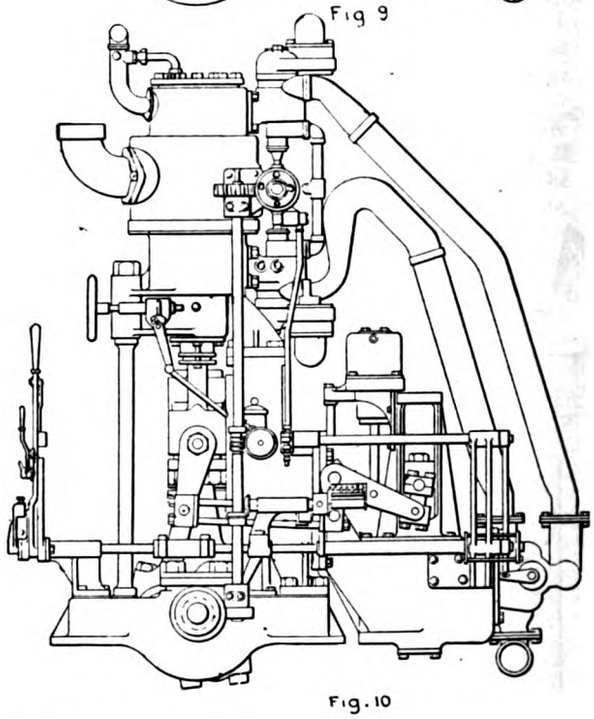


Fig. 10

FIGS. 7 TO 10—THE 100-H. P. ENGINE OF THE YACHT PROGRESS.

The main engine is illustrated in Figs. 7 to 10. As shown in Fig. 9, provision was made for water cooling the piston, but this has proved unnecessary. Each cylinder, as may be seen, is constructed somewhat on the well-known Korting lines, the exhaust taking place through ports provided around the middle of the cylinder, these ports being uncovered by the piston as it approaches the end of each stroke. A large three-cylinder air pump, the piston displacement of which is from two or three times as great as the displacement of the pistons in the working cylinders, is arranged as indicated in Fig. 9, occupying much the same place as the air and circulating pumps in a common type of marine engine. The linkage (best seen in Fig. 10) by which the pump is driven is arranged so that the pump piston is in quadrature with the main piston; that is, the air pump piston is at midstroke when the main piston is at the end of its stroke. Each cylinder of the air pump has also ports provided at the midpoint of its stroke, and it is through these ports that the gas supply (mixed with air) is sucked from the producer. As a consequence, during the first portion of the air-pump stroke, when the piston is between these ports and the air ports at the end of the cylinder, pure air alone can be sucked in. The supply pipes for this air are at A and B in Fig. 9. Upon the descent of the air-pump piston, pure air enters at A, partially filling the long connecting pipe C. Later on, the air-pump piston uncovers the ports in its cylinder, and during the remainder of its stroke mixture is drawn in. Just after

this piston reaches the end of its stroke, the working piston uncovers the exhaust ports in the main cylinder, so that the pressure there has been reduced to that of the atmosphere. Hence, on the air-pump piston begin-

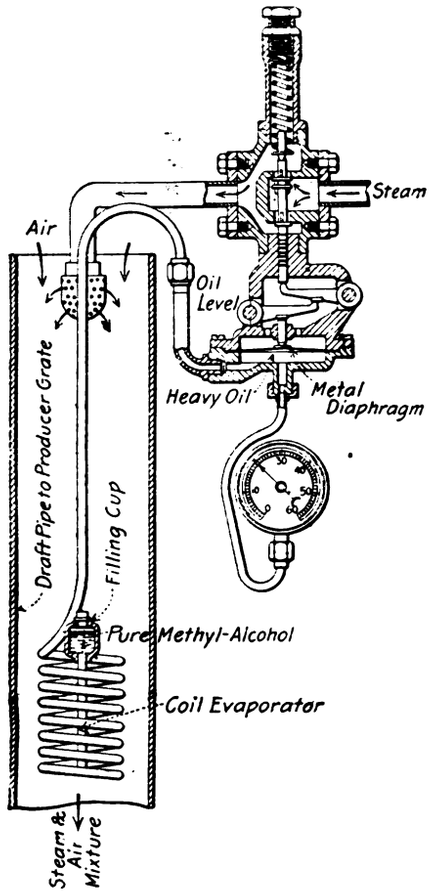


FIG. 11—REGULATOR OF STEAM SUPPLY TO PRODUCER.

ning its return stroke, the valve D is lifted and the pure air which has collected at the top of the pipe C enters the cylinder and washes out the spent gases through the still open exhaust ports. The continued upward motion of the air-pump piston forces into the working cylinder a further supply from the pipe C, but this supply now contains gas, and the charge of mixture in the cylinder is compressed and fired in the usual way.

The Lodge electric ignition system is used and it has been found by actual experiment that with this a good spark will pass even when the plug is covered with a deposit of heavy oil. Ignition current is supplied by an accumulator which is kept charged by a small dynamo driven from the main engine.

The lower end of the working cylinder is connected to the other end of the air-pump cylinder and is scavenged and charged in exactly the same way as is the upper end. When the engine is to be reversed, the connections between the ends of the working cylinder and the ends of the air pump are changed over by the four-way valve shown at E, Fig. 9. By rotating this valve through a right angle the top of the working cylinder becomes connected to the bottom of the air pump, and vice versa.

An additional air pump, shown at F, Fig. 9, furnishes the supply of compressed air for starting and reversiny the engine. The air supply for this purpose is led to the engine by a pipe which passes along the back of the cylinders as indicated at G, Fig. 9. Branches connect this pipe with a couple of balanced valves normally held closed by springs and opened by cams on a cam shaft driven by spiral gearing from the main shaft,

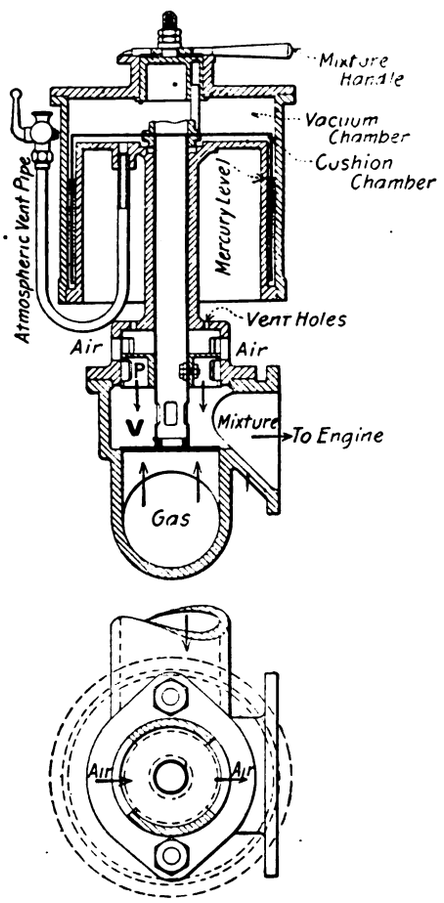


FIG. 12—MIXTURE CONTROLLER

as shown in Fig. 10. These cams do not "positively" open the valves, but do so through the intermediary of buffer springs. Hence, once the engine starts firing and the pressure consequently rises in the cylinder, the cams are no longer able to open the valves, but merely compress the springs, so that the air supply is automatically shut off as soon as it is no longer needed. In starting or reversing the engine the supply of compressed air is required for one or two revolutions at most. This feature affords great economy in the consumption of compressed air, and the engines have frequently been maneuvered to a far greater extent than would ever be required in practice, with but the small auxiliary compressor running and without material loss of pressure in the reservoir. In rough weather, if the supply of air is left on, it will prevent the accidental stoppage of the engine when it has been throttled down to prevent racing and the propeller is suddenly reimmersed. The range of speed over which the engine will run satisfactorily is from 40 up to 210 revolutions per minute.

The reverse lever of the engine is shown in its neutral position at K, in Fig. 7. It will be seen that there are two notches on each side of the central notch. Of each of these pairs of notches, the nearest the neutral notch corresponds to the running position of the engine, and the outermost to the starting position. With the lever in the starting position the cam shaft controlling the air supply is shifted so as to operate the air valves in correct sequence for the desired direction of rotation, and at the same time the spark is retarded in each cylinder and the four-way gas valves E are simultaneously moved so as to connect the appropriate end of the air cylinder to the top of the main cylinder. As soon as the engine starts firing, the lever is moved back to its running position, an operation which moves the cam shaft clear of its followers. As instancing the handiness of the engine, it may be stated that, in coming out of dock on one occasion 26 different movements were made in the course of 21 minutes. The time taken to reverse has been found to be from three to four seconds after the order is given.

The main difficulty experienced in securing easy manipulation of the engines was due to the producer. In land practice a suction-gas plant, once started, runs commonly without violent fluctuations in the output demanded. With a marine engine, when coming in or out of port, the conditions are very different, and it was found that special steps must be taken to maintain the quality of the gas and the strength of the mixture, whatever the temporary draft on the producer. For producers furnishing gas to a land engine the supply of water or of steam can be conveniently adjusted by hand, but experience showed that an automatic control was desirable for the supply to a marine producer.

To provide this control, the apparatus illustrated in Fig. 11 was devised. The steam supply (at atmospheric pressure) is obtained from a small separately fired boiler. The steam is delivered through a rose

sprayer fixed, as shown, at the top of the air pipe leading beneath the grate of the producer. Lower down in this pipe a coil of tubing is fixed, which is charged with pure methyl alcohol. The top of this coil is connected to a pipe leading to a chamber below a flexible diaphragm, which chamber is filled with heavy oil. A series of magnifying levers transfer any motion of the flexible diaphragm to a balanced valve which controls the supply of steam to the sprayer. At full speed this valve is fully open and a full supply of air and steam is drawn through the draft pipe into the producer. When the speed of the engine is suddenly reduced, the vacuum in the producer falls off and there is less suction in the draft pipe. Therefore less air is drawn in, and the coil containing the methyl alcohol is raised in temperature by the excessive supply of steam. As a result the vapor pressure inside this coil is raised and the increased pressure, acting on the flexible diaphragm, moves the latter, closing the steam valve more or less. When the speed of the engine is increased, after having been reduced, a larger quantity of air is sucked into the draft pipe; this cools down the coil, lowering the pressure within it, and the steam valve is then forced open by the spring above it.

To maintain automatically the proper relative proportion of gas and air in the charge supplied to the engine, the device illustrated in Fig. 12 is employed. This is essentially the same in function as some of the automatically adjustable carbureters used on motor car engines.

A bell dipping into mercury is provided inside a "vacuum" chamber as indicated. This bell is connected by a hollow stem to a gas valve shown below at V, and has also mounted on it at P a loosely fitting piston, which, when in its lowest position, shuts off all connection between the outer air and the supply pipe to the engine. When a charge is being drawn into the latter, the partial vacuum produced extends to the space above the bell through the hollow stem. The bell therefore rises, opening simultaneously the gas valve V and the air ports. The air which enters passes through slots in the air piston, and by rotating the latter, the relative proportions of air and gas can be adjusted. This adjustment is made by turning the mixture handle, shown at the top in Fig. 12. The position of this having been once adjusted to suit the quality of gas being used, the "carbureter" automatically maintains the proper proportion of gas and air during all changes of speed of the engine.

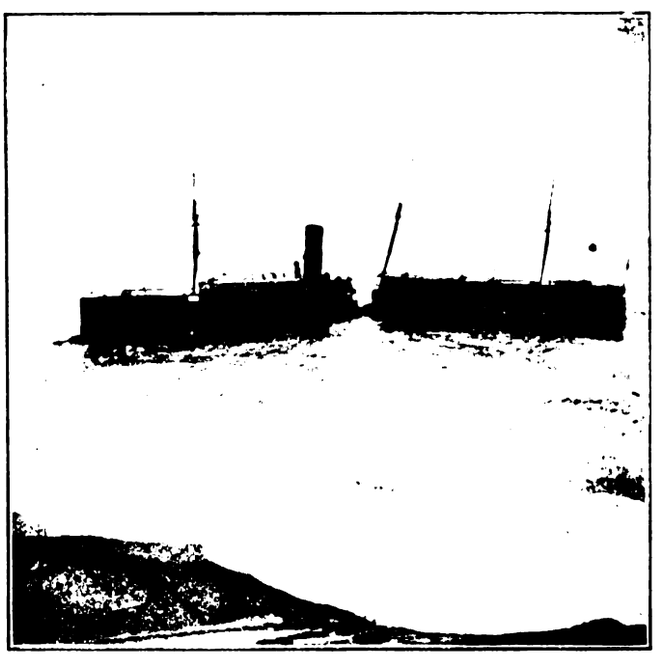
Both the barrel and the heads of the cylinders are water cooled, the water being circulated by a small pump driven by chain gear from the crank shaft. A second pump supplies the water needed for the scrubber.

For starting up the producer and for charging the reservoir of compressed air while in port, a small oil engine is provided. This drives a fan which gives the draft necessary for starting up the producer and a small Reavell air compressor for charging the reservoir.

The vessel is owned by the Empire Oil-Engine Syndicate, Ltd. C. H. T. Alston was responsible for the design of the engine, which was built for the syndicate by F. W. Rowlands & Co., of Birkenhead, and the consulting engineer, who has been associated with its development from the beginning, is P. T. Houston, of Houston & Gall. It is intended to build a second engine to develop from 350 to 400 horsepower, and a corresponding gas plant, in both of which a number of improvements in detail will be embodied. This plant will be installed in a vessel of the commercial type.—*Engineering.*

Wreck of the Santa Rosa

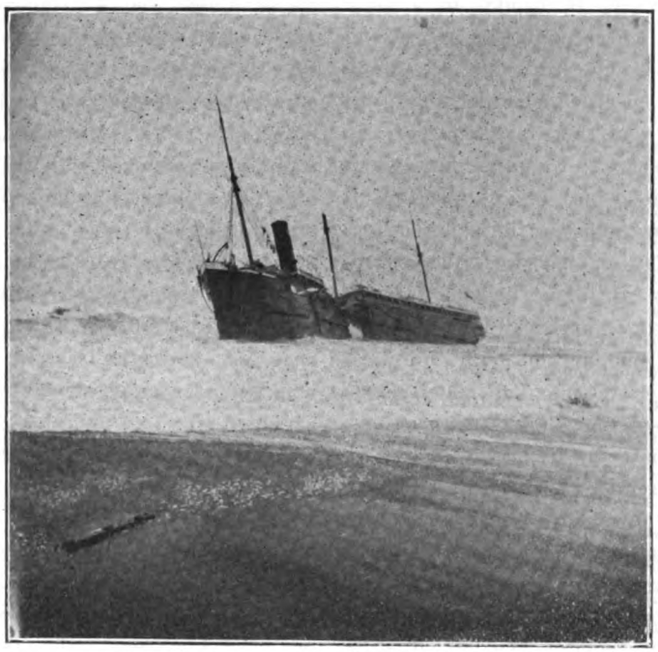
FOUR lives and possibly more were lost and property to the value of more than $600,000 was destroyed when the Pacific Coast Steamship Co.'s steamer Santa Rosa went ashore off Point Arguello, on the coast of California early on the morning of July 7. The vessel ran onto a thin sandy spit which extended into the ocean from the long sandy beach at Surf near Point Arguello, striking amidships, at about 3 o'clock in the morning. A hasty examination made by the officers disclosed the fact that the vessel was taking no water and the passengers were kept on board all day until four o'clock in the afternoon when rough weather set in and the boat commenced to break up. Offers were made by the steam schooners Helen P. Drew and Centralia to take off the 200 passengers of the Santa Rosa but Capt. Faria refused, believing that he could float his vessel at high tide in the afternoon. The two steam schooners and the Standard Oil Co.'s tug Argyle managed to get lines to the stranded vessel and tried to pull her into deep water but were unsuccessful, their large hawsers parting one by one, leaving the Santa Rosa helpless. The vessels stood by the entire day in an effort to be of assistance in landing passengers.



THE SANTA ROSA BROKEN AMIDSHIPS.

At about four o'clock in the after-

noon a heavy sea set in and the Santa Rosa commenced to show signs of distress, the turning of the tide and parting of the hawsers swinging her around broadside to the beach and starting the center plates in the midship section on the port side of the vessel. Within fifteen minutes the corresponding plate on the starboard side parted its rivets and the hull broke in two between the engines and boilers.



THE SANTA ROSA THE MORNING AFTER THE DISASTER, SHOWING THE BOW SECTION SWUNG AT NEARLY RIGHT ANGLES TO THE STERN.

The passengers who had been urging the captain to put them ashore during the entire day became panic stricken and it was with difficulty that the officers and crew could restrain some of them from going over board. A life boat commanded by Second Officer Heuson and manned by three sailors was launched and immediately dashed against the side of the vessel, wrecking it and drowning its occupants. By heroic efforts on the part of the officers of the engineering division a line was sent ashore and a cargo net rigged to carry the passengers to the beach. Several life rafts which were launched were washed away and while there is no one missing from the passenger lists, members of the crew declare that they saw several persons drowned when the rafts foundered.

The passengers were landed on the beach where they remained during the night and were taken to San Francisco and Los Angeles by train the next morning.

But a small portion of the baggage of the passengers was salvaged.

The Santa Rosa was of iron, having three masts, two decks and a shade deck, and was built in 1884 by J. Roach and Sons of Philadelphia. She was 326.5 ft. in length, 40.9 ft. beam and 20.7 ft. deep. She was equipped with 2 2-cycle 38-in. x 86¼ Roach engines having a horsepower of 455. The vessel was valued by the Pacific Coast Co. at $500,000 and carried insurance to the amount of $150,000.

The action of Captain Faria in keeping his pasesngers aboard the vessel when there were other vessels ready and willing to take them off has been strongly condemned on all sides, and testimony brought out at the inquiry by Inspectors Bulger and Bolles showed a state of affairs unusual, to say the least. The commander of the Helen P. Drew, his wireless operator and the wireless operator of the wrecked vessel, testified that wireless messages were interchanged having for their basis the fixing of a price for the removal of the passengers, the order originating in the offices of the Pacific Coast Co. The wireless operator of the Santa Rosa and Captain Faria testified that a message had been received from the general offices of the company directing that the passengers be kept on board until a bargain had been struck with the masters of the assisting vessels for the transportation of the passengers and crew. The latter also testified that if he had received no such message his first thought would have been for the safety of his passengers. The master of the Centralia testified that neither he nor his company had any thought of the fixing of compensation for what he thought was an urgent act of mercy and that he had answered that he was willing to take off the passengers and leave the discussion of compensation to the owners of the respective vessels.

Captain Faria testified that the failure of the dead second officer to call him as ordered was responsible for the vessel going ashore, and the steamship inspectors were forced to abide by his testimony as there was none to deny or affirm the statement.

Dangerous Navigation

The large number of wrecks which have befallen coasting vessels on the Pacific within the last few months has raised a storm of comment and criticism of existing practices on the part of vessel owners and many interviews have appeared in the newspapers from experienced mariners who declare that the practice of requiring steamers to hug the shore line is responsible for the disasters. It is claimed that by sailing close to the shore line money and time are saved and that this is the only consideration.

Rear Admiral C. T. B. Moore, U. S. N., commandant at the Naval Training Station at Yerba Buena Island, expresses himself as follows:

"On general principles danger is avoided by keeping a respectful distance off shore. All dangers should be given a wide berth which will enable one to avoid shipwreck. To run too close to the shore as to endanger the vessel is in my opinion foolish navigation and I should think that the companies would rather lose an hour or two than lose their vessels. There would be fewer shipwrecks if the shore were given a wider berth."

Rear Admiral Thomas S. Phelps, U. S. N. (retired), who several months ago was the storm center of the navy because he insisted in running his station on business principles and to accomplish whose removal the entire force of commandants of the navy was changed, in an interview soon after the Santa Rosa disaster said:

"I surely do not believe in hugging the shore. It is certain that a great many accidents are caused by this practice especially when a proper lookout is not kept and lights picked up are not promptly reported. These accidents would be avoided if the shore were given a wider berth. It is a good thing in making a light or headland to keep a couple of points off to go well clear of it. I don't think that any navigator should run the risk of going too close to shore to save time on a voyage."

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Steamship's Monopoly on the Pacific

Congress seems bent upon making investigations that serve only to harass and embarrass trade and to delay the return of a normal state of industry by keeping capital in a state of unrest. These numerous, trivial and even foolish investigations are doing more to unsettle business than any thing else and there apparently is no end to them. If congress, however, is in the mood to investigate, let it tackle something worth while—a foeman worthy of its steel—the steamship trust which in defiance of the anti-trust laws practically monopolizes American shipping on both the western and eastern oceans, and levies tribute upon the whole American people, a tribute far in excess of any legitimate service performed. This is the most formidably entrenched trust of all, masked behind a battery of newspapers, having as proved last winter even a servant of the Associated Press in its employ, daring and capable, infinitely resourceful and imbued with the idea that this country was made for exploitation only. Nothing more arrogant can be imagined than the attitude of the steamship trust towards the United States government. It assumes virtual dictatorship, setting aside its laws and directing its manufacturers how they shall and shall not ship, what ports they shall ship over. The average trust magnate would stand aghast at such unspeakable audacity—and yet it is the daily program of the steamship combine and the American merchant and manufacturer daily suffer from it. And what is worse the American people continue to stand for it and an American congress sits supine, inactive and inocuous. Believe us, there will some day be an awakening of the people and there will some day be a congress that will not brook this insufferable insolence and insupportable situation. An inalien right cannot be forever trampled in the dust.

There is a voice crying in the wilderness, the voice of William E. Humphrey, member of congress from Seattle, and for the stalwart fight which he now wages single-handed the country will some day do him credit. He has repeatedly pointed out that there is no such thing as open competition on the high seas, that 90 per cent of the commerce of this country is carried in ships which are not operated on a competing basis and that rates for both passengers and freight are fixed by agreement and not, as they should be, by the natural laws of trade. Moreover, through traffic arrangements with the railways, they direct interior shipments and dictate the lines of transit. He has hammered into congress the fact that the steamship trust is the greatest trust on earth, and affects American industrial life more vitally than any combination of capital, since it acts as a barrier to the free interchange of trade with the outside world. But congress views the spectacle with indifference and is evidently content that there shall be one law for the foreigner in this land and another for the citizen, that there shall be a relentless hounding of a domestic combination of capital notwithstanding that such combination may be of material benefit to the nation, and complete and undisturbed immunity for a foreign combination of capital operating to the great disadvantage of the American people. It is about time that somebody woke up.

Congressman Humphrey has submitted to the public through *Pearson's Magazine* information of a character which cannot be overlooked by congress, if it is sincere in its investigations of trusts that are designed to restrain trade. He has latterly come into possession of the agreement now in force between the trans-oceanic lines on the Pacific. As it is brief, it is appended to this article. It will be observed that it embraces all the lines, including the Pacific Mail and The Great Northern Steamship Co., but these two American lines are not to be condemned, for their acquiescence in its provisions was undoubtedly their only salvation. However, the document is its own indictment. The fact that its execution is made effective in Yokohama is only a subterfuge. Observe the tyranny of it, particularly

that part which the lines have seen fit to emphasize by displaying in capital. The article follows:

"In the May issue of this magazine I gave some facts demonstrating that of the vast foreign commerce of this country more than 90 per cent was carried in ships between which there was no rate competition. That passenger and freight rates from the ports of this country to all ports overseas were not fixed by competition and the laws of trade, but by agreement. That the railroads in connection with these ships fixed the rate for interior traffic and directed through what ports this traffic should pass and what proportion of it should be carried by each line. That this combination of foreign ships was by far the greatest trust in the world. That it levied a tribute of more than $20,000,000 annually upon the American people over and above a just compensation for services rendered. That this combine practices every plan known to the ingenuity of skillful men to destroy competition and to creat monopoly. That this combine did these things defiantly and practically challenged the United States government to prohibit it. That today we have in this country one law for the foreigner and another for our own citizen, so far as trade and commerce are concerned.

The Agreement.

"In view of the steel trust and the sugar trust now under way by congressional committees, and the recent decision of the supreme court of the United States in the cases of the Standard Oil Co. and the tobacco trust, it seems to me that now is a most opportune time to again call the attention of the people of this country to the open and flagrant violation of our anti-trust laws by a greater and more injurious trust than any of these just mentioned. In the former article I referred particularly to the written agreements between the lines of the Atlantic, both between here and Europe and between here and South America. Copies of these written contracts were already in the possession of the Department of Justice. In that article I referred only in general terms to the conditions on the Pacific. For several years I knew in a general way that the Pacific lines were in the combination, but I had never been able to secure a copy of the contract. Within the last few days, however, I have received a copy of the contract now in force between the trans-oceanic lines upon the Pacific. I believe it is in this article for the first time made public. It explains some things that have heretofore been mysterious to some. When merchant marine legislation has been pending in congress it has sometimes been said that it was inspired by the Pacific Mail and the Great Northern Steamship Co., and that it was largely for the benefit of these lines. Many of these statements were made ignorantly and honestly, but many of them were made purposely to create a prejudice against proposed legislation without any regard for the truth, or any desire to know the facts. But every one knew who gave the question real consideration that all legislation of this kind has met either the active or passive opposition of both these American lines on the Pacific. The manager of the Pacific Mail has openly and frankly opposed before committees and in letters to individual congressmen all legislation of this character, and Mr. Hill condemned it in various public addresses.

"These gentlemen are hardly to be condemned, as the propositions generally were to start a government aided line to compete with their lines without giving them any government aid. However, it is now clear that these American lines did not, or at least do not, need government aid, because they are part and parcel of the monopoly that controls the Pacific. There should be hesitation in condemning them for doing this. It was for them either go into the monopoly or be driven from the ocean. As much as monopoly is to be condemned, if we must have it let us at least let our own ships share the gain with foreign ships. Yes, if we must be robbed, who of us would not rather it be done by an American than the foreigner? While, in all the circumstances, I am not passing judgment upon the American lines upon the Pacific in this combine, yet the facts now established explain why the representatives of these lines have been so complacent over the defeat of all legislation looking to the upbuilding of our merchant marine. The system of the Pacific lines is the one of deferred rebates. This is the plan generally used in the trade throughout the world where freight is the controlling factor. It is the same system that is used between here and South America. There can be no doubt that the contract of the Pacific lines is a clear violation of our anti-trust laws. An attempt and, I believe, an ineffectual one, is made to evade them by having the contract executed in Yokohama. As this agreement is a short one, I give it in full. It is the one entered into with all their customers. The only thing omitted from this copy of the contract is the name of the issuing line in the body of the agreement. Here it is:

"To those exporters from Japan ports to Pacific Coast ports of the United States and Canada, who, from the 15th February, 1911, to the 31st December, 1911, may have found it to their interest to confine their support and shipments to ———— we have decided to allow a rebate on the freight paid as bill of lading, as follows:

On Pacific coast cargo:

All cargo (except raw silk, silk goods, rice, peanuts and cement) a rebate of $1 gold per ton weight or measurement as per bill of lading.
Raw silk, net.
Silk goods, net.
Rice.
Peanuts—Rates open.
Cement, a rebate of 10 cents per cask.

On ocean proportion of through rates to overland points:

All cargo (except raw silk and silk goods) a rebate of 20 per cent, off the ocean proportion of the through rate.
Raw silk, net.
Silk goods, net.

"On the 1st of July, 1911, to those exporters from Japan, who, from the 15th February, 1911, to the 30th June, 1911, may have found it to their interest to confine their support and shipments during that period to ———— ————, we shall be glad to allow a return of 50 per cent of the above rebate on the freight paid as per bill of lading.

"On the 2d January, 1912, to those

exporters who, on the 31st December, 1911, may have found it to their interest to confine their support and shipments during the previous 10 and a half months to the said line, we will allow a further 50 per cent of the above rebate, on freight contributed from the 15th February, 1911, to the 30th June, 1911, and 50 per cent of the above rebate on freight contributed during the six months from the 1st July, 1911, to the 31st December, 1911.

"On the 1st July, 1912, to those exporters, who, on the 30th June, 1912, may have found it to their interest to confine their support and shipments during the previous 16 and a half months to the said line, we will allow a further 50 per cent of the above rebate on freights contributed during the six months from the 1st July, 1911, to the 31st December, 1911, and 50 per cent on freights contributed during the six months from the 1st January, 1912, to the 30th June, 1912.

"Until further notice future rebates will be payable semi-annually on the same terms and conditions as above set forth.

"Until further notice, shipments made by the Pacific Mail Steamship Co., Toyo, Kisen Kaisha, Portland and Asiatic S. S. Co., Canadian Pacific Railway Co.'s Royal Mail Steamship Line, Nippon Yusen Kaisha, Bank Line Limited, Great Northern S. S. Co., Ocean S. S. Co., Ltd., China Mutual S. N. Co., Ltd., Osaka Shosen Kaisha, will not invalidate claims for the above.

"NO REBATES WILL BE PAYABLE TO ANY EXPORTER, SHIPPER, OR CONSIGNEE WHO HAS ACCEPTED CONCESSIONS OF ANY NATURE FROM ANY STEAMSHIP LINE OTHER THAN THE ABOVE AGREED RATES.

"Exporters applying for the rebate which will be payable in Yokohama and Kobe on and after the 1st July, 1911, and January, 1912, and 1st July, 1912, respectively, must fill up and sign forms in accordance with the above terms and conditions.

Yokohama, January 25th, 1911."

Under this contract all the great commerce of the Pacific is today absolutely controlled, and every shipper on that ocean of a pound of freight compelled to pay tribute to this illegal combine.

See America First

The city of Baltimore has organized a Greater Baltimore committee, and is now prosecuting a campaign of publicity through competent managers for the purpose of directing attention to the advantages of Baltimore. The committee is going about its business in a broad-minded and patriotic way, and is projecting an exposition to be held in Baltimore to be known as the "See America First" Exposition. There is much to this. For every natural wonder that Europe has America has ten. The Alps are only little brothers of the Rockies. Yellowstone Park, Yosemite Valley, the Canadian Rockies and the Grand Canyon of Arizona are unrivaled, and yet how few have seen them. Of course, Europe is rich in history and human interest, but an American citizen owes it to himself to have some acquaintanceship with the natural wonders of his own land first of all. Baltimore is really performing quite a patriotic service in projecting an exposition along these lines.

Steamer Geronia

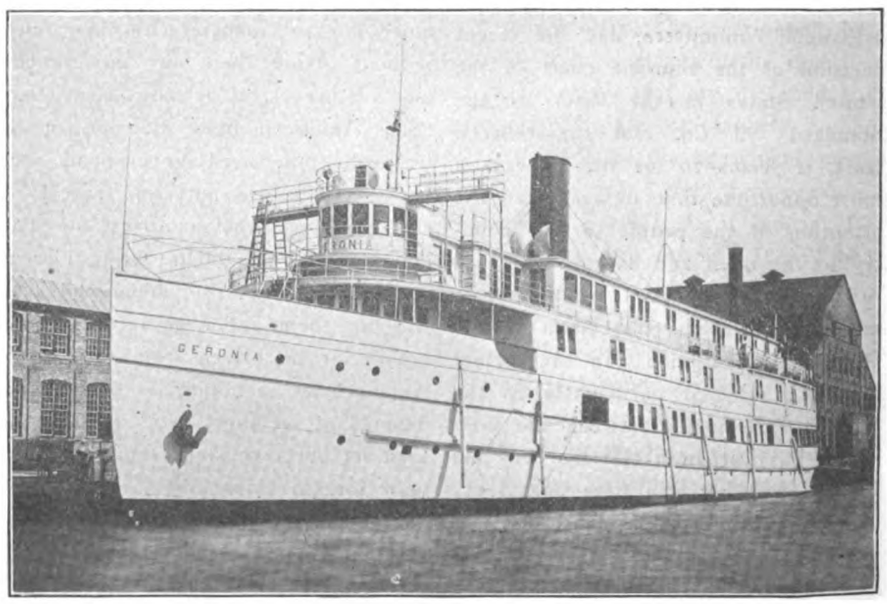
The new steamer Geronia of the Ontario & Quebec Navigation Co.'s fleet underwent her maiden trip on July 27. She was built at the yard of the Collingwood Ship Building Co., Collingwood, Ont. The new steamer is 200 ft. long, 42 ft. 6 in. beam and 11 ft. 6 in. deep, and is equipped with quadruple-expansion engines 12½, 18, 26 and 40 in. cylinder diameters by 18 in. stroke, supplied with steam from two Scotch boilers 12 ft. 6 in. by 11 ft. 2 in. equipped with Howden draft and allowed 250 lbs. She will operate between Toronto and Quebec.

Steamer Tampa Sunk

The steamer Tampa, owned by Henry Wineman Jr., of Detroit, was sunk in the Detroit river off Walkerville, Ont., about four o'clock on the morning of July 18, when the steamer John W. Gates, of the Pittsburg Steamship Co.'s fleet, took a sudden sheer by reason of the breaking of her steering gear. The Tampa was unloading a cargo of sand at Walkerville when the Gates struck her on the port side aft of the boiler room. The Tampa was torn from her moorings and floated down stream until she sank. The Pittsburg Steamship Co. immediately undertook the work of raising the sunken steamer.

Steamer Drummond's Record

During June the steamer Thomas J. Drummond, of the Algoma Central Steamship Line, established a record in the delivery of ore for a 3,000-ton vessel. From May 30 to June 30 she delivered at the Sault nine cargoes of iron ore and two cargoes of iron



STEAMER GERONIA, BUILT BY THE COLLINGWOOD SHIP BUILDING CO., COLLINGWOOD, ONT.

pyrites. Of these 11 cargoes one was loaded at Escanaba, two at Marquette and eight at Michipicoten. The Drummond, which is named after Thomas J. Drummond, of Montreal, president of the Lake Superior Corporation, was built at Glasgow, Scotland, by McMillan & Son, in 1910, and is 256 ft. over all, 43 ft. 10 in. beam and 26 ft. deep.

Steamer John Mitchell Sunk

The steamer W. H. Mack, downbound light, collided with the steamer John Mitchell, upbound with coal, in

HEAD-ON VIEW OF MACK'S CRUSHED BOW.

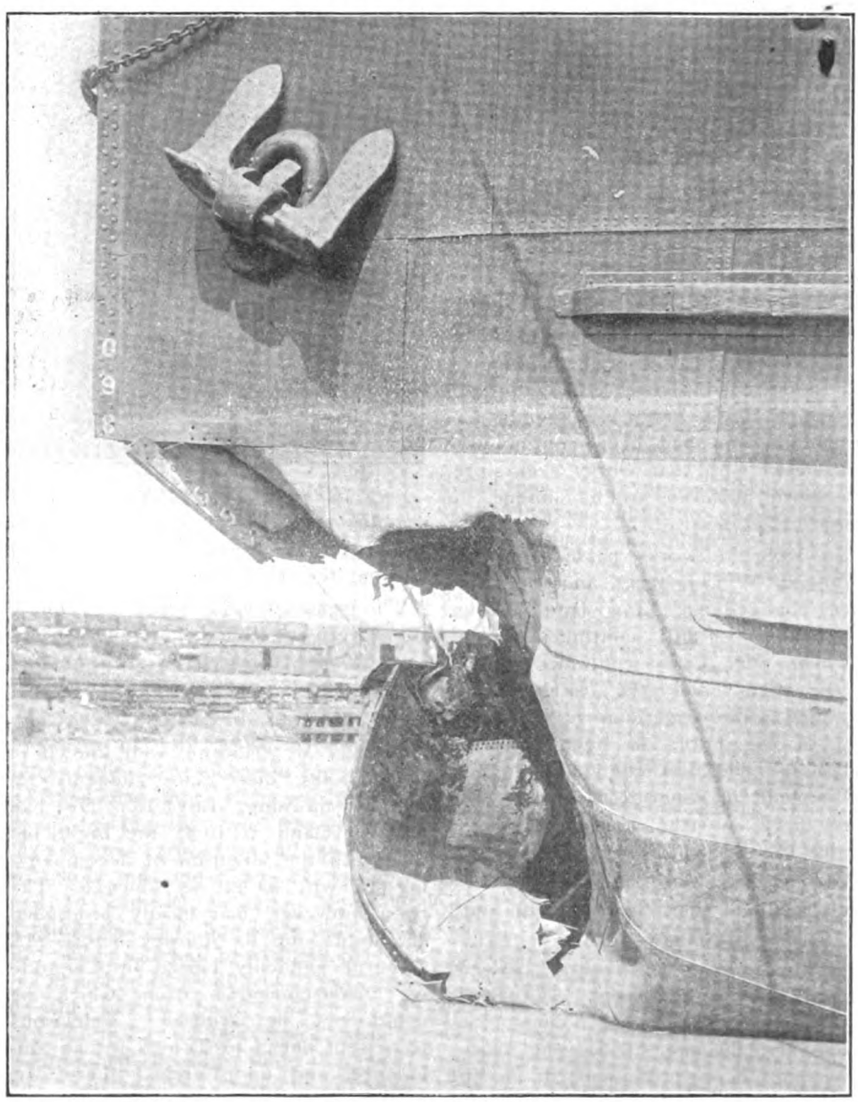
Whitefish bay, Lake Superior, during a heavy fog in the early morning of July 10. The Mack struck the Mitchell on the starboard side, cutting a deep gash through which the water poured in tons. Seven minutes later the Mitchell rolled completely over and disappeared. The Mack stood by and the crew and passengers safely crossed over to her by means of a ladder which was placed on the Mitchell's stern. Three members of the crew of the Mitchell, however, who were busily engaged in the work of rescue leaped overboard just as the Mitchell was turning turtle and were caught in the suction of the sinking steamer and drowned. The Mack proceeded to the Sault, where temporary repairs were made to enable her to make the trip to Lake Erie. She was docked at Lorain. The accompanying photographs show the extent of her injuries, and indicate that the impact must have been terrific, as the bow is crushed in to the collision bulkhead. Moreover, quite a number of her plates are damaged. She will be out of commission for about four weeks.

The John Mitchell was owned by C. W. Elphicke & Co., of Chicago, and was built at the St. Clair yard of the Great Lakes Engineering Works in 1907. She was 440 ft. over all, 420 ft. keel, 52 ft. beam and 28 ft. deep. The W. H. Mack belongs to the fleet of the Jenkins Steamship Co., and was built in 1903 at the Cleveland yard of the American Ship Building Co. She is 374 ft. over all, 354 ft. keel, 48 ft. beam and 28 ft. deep.

Power Boat for Duluth Harbor

J. Murray Watts, 320 Chester street, Philadelphia, has just designed a gasoline power boat to be used as a patrol boat by the government engineer at Duluth. As she is intended to navigate late in the season when she may encounter ice at least in the process of formation, she is heavily sheathed and has practically about double the displacement of the ordinary yacht of her size. Heavy white oak frames and planking, bronzed bolts for fastening and heavy bronze castings for all her fittings insure a long life with hard service. As she is intended to supervise the traffic of Duluth harbor as well as note the progress of work on docks, jetties, and breakwaters, she has been fitted with a photographic dark room for the use of the government engineer in illustrating his reports. Her gasoline motor will be of 125 H. P.

Captain John F. Hansen has been appointed assistant local inspector of hulls at Detroit, to fill the vacancy recently created when Capt. H. C. McCallum was promoted to local inspector of hulls at Toledo, succeeding Capt. C. A. Potter, transferred to Oswego. Capt. Hansen was master of the steamer Thomas Cranage.



PORT VIEW OF THE MACK'S CRUSHED BOW.

Obituary

One of the most widely known and respected figures in American marine engineering circles passed away on July 29, 1911, in the person of Henry G. Trout, of Buffalo, N. Y. Mr. Trout's death, which was entirely unexpected, although he had reached his

HENRY G. TROUT.

83rd year, occurred in Brooklyn, N. Y., where, with his wife, he had gone on a pleasure trip.

Mr. Trout was born in Canada in 1827, and in 1850 entered the employ of the Shepard Iron Works, Buffalo, of which H. O. Perry was then superintendent, and had been continuously associated with that works ever since, a record believed to be unique, in America, at least.

In 1868 the works passed into the hands of Wm. J. King, and the name was changed to King Iron Works, by which it still continues to be known. Mr. Perry continued as superintendent and the establishment attained widespread fame in the building of the Perry & Lay compound engines. The first compound engines to be built in America are believed to have been constructed at these works under the Perry & Lay patents.

Mr. Trout leased the works in 1873 and retained their management until his death.

Although over a hundred vessels, among them many of the best of their time and class, received their engines from Mr. Trout's hands, the works have not been prominent in marine engine building for a number of years, because of the almost total cessation of wooden ship building and the concentration and consolidation of steel ship building plants. The works has, however, enjoyed a very large business in repairs and in the making of propeller wheels. In the latter in particular Mr. Trout was eminently successful.

Mr. Trout will be best remembered, however, by those who knew him for his kindly nature and his unswerving and rugged honesty. Although willing to lend a helping hand, he never gave expression to an unkind or harsh reference; indeed, it is doubtful if he ever thought unkindly of any one. His was a lovable disposition and those who most appreciated him were those who knew him the longest.

Death was due to heart failure, and occurred just as Mr. Trout had returned to the house from a little out-

FRANCIS A. OSBORNE.

ing, without warning and probably without the least pain.

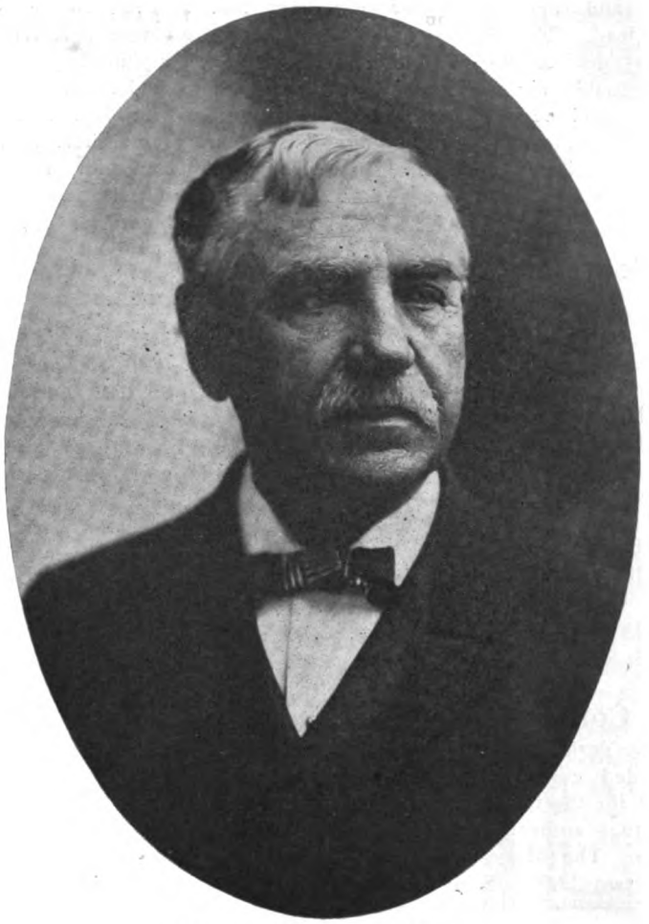
The remains were taken to Buffalo for interment, and the funeral was one of the largest ever seen in that city.

Francis M. Osborne, well known in lake circles, died quite suddenly on Sunday morning, July 16. He had left Cleveland at 10:45 the night before with the intention of accompanying his wife as far as Chicago. The train, however, had hardly proceeded 45 minutes on its journey before Mr. Osborne suddenly lapsed into a state of unconsciousness from which he could not be aroused. Telegrams were sent ahead to Toledo for an ambulance, and upon arrival there Mr. Osborne, still unconscious, was taken to the hospital, where he died within a few hours. The cause of his death was cerebral hemorrhage. Mr. Osborne was born at Girard, O., March 12, 1855, and was a first cousin of President Wm. McKinley, their mothers being sisters. As a boy Mr. Osborne worked around the steel mills at Girard, and in a coal mine at Palmyra, moving to Cleveland to take a position as bookkeeper in the late seventies. He gradually branched out into the coal business for himself, and in the late nineties came to be regarded as one of the leading operators. He was largely instrumental in forming the Pittsburg Coal Co., of which he was the first president, resigning to organize the Youghiogheny & Ohio Coal Co. He also engaged in the vessel business and still retained the steamers John W. Moore and Louisiana at the time of his death. Soon after he came to Cleveland, Mr. Osborne married Miss Dolly Morris, who survives him. He leaves nine children, four girls and five boys.

H. S. Haselton, of the firm of Pickands, Mather & Co., died very suddenly at the Union Club, Cleveland, on July 27. He had just entered the club and complaining of a headache sank upon a sofa, expiring before medical aid could be summoned. Mr. Haselton was born Dec. 29, 1857, at Janesville, Wis. He was a son of

H. S. HASELTON.

Gerald M. Haselton, a pioneer settler of Janesville. After receiving the common school education he entered the general store in which his father had been employed, studying stenography meanwhile at night. When he had attained his majority Mr. Haselton



SENATOR WILLIAM P. FRYE

became private secretary to S. P. Burt, vice president of the North Chicago Rolling Co., Milwaukee. Mr. Burt was also secretary of the Metropolitan Iron & Land Co., which was engaged in iron ore prospecting, and when he died Mr. Haselton succeeded him as secretary. S. S. Curry, a pioneer in the development of the Menominee iron range, was also identified with the Metropolitan Co., and for years he and Mr. Haselton were closely associated in business. Together they developed the Norrie mine on the Gogebic range. When this celebrated mine was purchased by the Oliver Iron Mining Co., about 1899, Mr. Haselton entered the office of Pickands, Mather & Co., taking charge of their ore mining operations.

Senator Wm. P. Frye, one of the stanchest champions that the merchant marine ever had, died at Lewiston, Maine, Aug. 8. He had not been in good health for some time, having been forced to relinquish his position as president pro tem of the senate last spring. Senator Frye was eighty-one years old. He was born at Lewiston in 1830. With the exception of Justin S. Morrill of Vermont and Wm. B. Allison of Iowa, Senator Frye had the longest continuous congressional record, covering a period of nearly forty years. He succeeded James G. Blaine in the senate. Mr. Frye made a profound study of the shipping question and steadily endeavored to promote the cause of the American merchant marine through legislation. He was a remarkable man and the last of a great coterie of Maine statesmen.

July Ore Movement

The ore movement during July passed the 5,000,000-ton mark, being 5,221,373 gross tons. While this shows a decrease of 1,723,916 tons over the movement of July, 1910, it is nevertheless quite a respectable movement and somewhat more than was expected considering that wild vessels cannot get ore cargoes at all and that the whole movement was really confined to contract vessels. Notwithstanding the fact, however, that contract ships carried nearly all of the ore, shippers have difficulty in keeping the vessels busy. They could have cared for the movement with a less number of ships than they actually had under contract, proving quite conclusively that there are far more ships on the lakes than there is business for. During 1910, 42,000,000 tons of ore were moved and it is now expected that the 1910 movement will be somewhere between 30,000,000 and 35,000,000 tons. There was a decided slump in shipments during the latter half of 1910 and there may be no marked difference between the 1910 and 1911 movements during the balance of the year. To Aug. 1 the fleet has moved 14,064,291 gross tons as against 21,863,549 tons for the corresponding period in 1910, a decrease of 7,799,258 tons. If the fleet therefore moves as much ore during the remaining months of the year as it did last year, the total movement for the season will be about 34,000,000 tons. Furnacemen have not been coming actively into the market and ore sales are inconsiderable. It is expected that the season will close early. Following are the shipments by ports:

Port.	July, 1910.	July, 1911.
Escanaba	725,123	644,098
Marquette	573.632	309,438
Ashland	718,309	439,843
Superior	1,262,468	1,747,364
Duluth	2,344,226	1,108,316
Two Harbors	1,321,531	972,314
	6,945,289	3,221,373
1911 decrease		1,723,916

Port.	To Aug. 1, 1910.	To Aug. 1, 1911.
Escanaba	2,464,859	1,711,806
Marquette	1,723,877	843,177
Ashland	2,233,864	1,102,263
Superior	3,895,303	4,698,855
Duluth	7,441,488	7,158,450
Two Harbors	4,104,158	2,549,740
	21,863,549	14,064,291
1911 decrease		7,799,258

Lake Erie Ore Receipts

Of the total movement of 5,221,373 gross tons of ore moved during July, 4,046,190 tons came to Lake Erie ports, distributed as follows:

Port.	July, 1911.
Buffalo	539,943
Erie	9,094
Conneaut	1,154,268
Ashtabula	884,198
Fairport	122,637
Cleveland	776,571
Lorain	442,516
Huron	48,894
Sandusky	.....
Toledo	55,621
Detroit	12,448
Total	4,046,190

Commerce of Lake Superior

The report of the superintendent of the canals at Sault Ste. Marie shows that 8,545,819 net tons of freight were moved through the canals during July. This is the heaviest movement of any month during the year,

7,476,087 tons having been moved in June. The movement of Aug. 1 is 22,939,511 tons as against 30,302,244 tons for the corresponding period last year, a decrease of 7,362,733 tons. Coal is the only item that shows a sensible gain over the movement of last year. Following is the summary:

East Bound.

	To Aug. 1, 1910.	To Aug. 1, 1911.
Copper, net tons	58,025	55,860
Grain, other than wheat, bu.	20,646,429	13,983,839
Building stone, net tons	1,877	3,142
Flour, bbls.	2,959,177	2,485,779
Iron ore, net tons	21,096,934	13,403,160
Pig iron, net tons	13,785	15,169
Lumber, M. ft., B. M.	285,342	247,370
Wheat, bu.	27,729,066	28,621,113
Unclassified freight, tons.	68,084	49,873
Passengers, number	13,664	18,528

West Bound.

Coal, anthracite, net tons.	815,070	938,432
Coal, bituminous, net tons	5,425,430	5,899,591
Flour, bbls.	1,100	125
Grain, bu.	2,100	1,100
Manufactured iron, net tons	214,561	181,446
Iron ore, net tons	.....	9,486
Salt, bbls.	324,704	303,043
Unclassified freight, tons.	561,196	565,727
Passengers	16,406	21,935
East bound, tons	23,237,769	15,299,750
West bound, tons	7,064,475	7,639,761
Total	30,302,244	22,939,511

Vessel passages to Aug. 1, 1911, 8,088; net registered tonnage, 18,010,793.

New Revenue Cutters

The Newport News Ship Building & Dry Dock Co., Newport News, Va., will build two revenue cutters for the revenue cutter service upon plans somewhat modified from those originally drawn. The contract price is $244,000 each. The new vessels will be 200 ft. over all, 180 ft. between perpendiculars, 34 ft. beam molded, 15 ft. 6 in. draught and of 1,324 tons displacement. They will be schooner rigged with two-pole masts. The machinery will consist of a triple-expansion engine with cylinders 20, 32½ and 54 in. diameters with a stroke of 36 in., supplied with steam from two straight tube water-tube boilers allowed 200 lbs. pressure. As their principal business will be searching for derelicts they will carry sufficient coal for a cruising radius of 5,000 miles at moderate speed.

Stranding of Ivernia

The Cunard Liner Ivernia stranded on Daunt's Rock on May 24. An investigation showed that the ship was being correctly navigated, but that a disarrangement which could neither have been foreseen or avoided had taken place in the compass and threw her somewhat out of her course. It developed, however, that the captain was not using his lead and was moreover traveling faster than was prudent in thick weather. The captain was censured by the investigating committee and fined $250 for not using the lead. The lead is one of the simplest devices aboard ship, and if masters would only use it regularly strandings would be few and far between. Nine-tenths of the strandings occur through failure to use this simple little device.

Tow Boats for the Ohio River

The Toledo Ship Building Co., Toledo, as sub-contractor, is building the hulls of three steel tow boats for the United States government for use on the Ohio river. The tow boats are over 137 ft. long, 30 ft. beam and 4 ft. 6 in. deep. They will be knocked down for shipment and assembled on the blocks at the plant of the Charles Barnes Co., of Cincinnati, which has the contract for the completed boats and which will supply the machinery.

Naval Colliers and Tugs

The New York Shipbuilding Co. has been awarded contract by the navy department for the construction of two sea-going tugs authorized by congress last March. The Maryland Steel Co. will build two 12,000-ton 14-knot colliers that are not to be constructed under the eight-hour restriction. The New York Shipbuilding Co. will build two colliers under the eight-hour restriction. There still remains to be let under the authorization of last March contracts for two first-class battleships, eight torpedo boat destroyers, four submarines, one submarine tender, one gunboat and one river boat.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., in addition to the contract for two colliers recently awarded it by the navy department, has on its books contracts for the battleship Texas, two revenue cutters, a freight steamer for A. H. Bull & Co., a freight steamer for the New York & Porto Rico Steamship Co., two submarine torpedo boats, two big turrets for fortifications at Manila, boilers for the battleship New York and considerable repair work. Some 5,000 men are now on the pay roll, and these will be increased to 6,000 within a month or more.

The Carnegie Coal Co. has let contract to Whitney Bros., Superior, Wis., for its coal dock at Duluth.

SUMMARY OF NAVAL CONSTRUCTION.

Name of Vessel.	Building at.	Per cent of completion. 1911. June 1.	July 1.
BATTLESHIPS.			
Florida	Navy Yard, New York	93.4	94.3
Utah	New York S. B. Co.	98.3	99.2
Wyoming	Wm. Cramp & Sons	65.6	68.8
Arkansas	New York S. B. Co.	66.2	68.4
Texas	Newport News S. B. Co.	13.5	19.3
New York	Navy Yard, New York	0.4	1.3
TORPEDO BOAT DESTROYERS.			
Mayrant	Wm. Cramp & Sons	99.4	99.6*
Monaghan	Newport News S. B. Co.	98.1	100.0*
Walke	Fore River S. B. Co.	98.5	98.7
Patterson	Wm. Cramp & Sons	83.3	86.0
Fanning	Newport News S. B. Co.	21.5	27.1
Jarvis	New York S. B. Co.	10.4	18.0
Henley	Fore River S. B. Co.	10.9	11.9
Beale	Wm. Cramp & Sons	22.7	33.0
Jouett	Bath Iron Works	31.2	43.5
Jenkins	Bath Iron Works	26.9	34.0
SUBMARINE TORPEDO BOATS.			
Carp	Union Iron Works	89.7	90.0
Barracuda	Union Iron Works	89.6	90.0
Pickerel	The Moran Co.	84.6	85.1
Skate	The Moran Co.	84.5	85.0
Skipjack	Fore River S. B. Co.	91.1	92.4
Sturgeon	Fore River S. B. Co.	89.5	92.4
Thrasher	Wm. Cramp & Sons	41.5	43.0
Tuna	Newport News S. B. Co.	74.0	75.2
Seal	Newport News S. B. Co.	87.1	87.7
Seawolf	Union Iron Works	31.2	34.1
Nautilus	Union Iron Works	31.2	34.2
Garfish	The Moran Co.	27.9	31.1
Turbot	Lake T. B. Co.	16.0	20.1
Haddock	Fore River S. B. Co.		No report.
Cachalot	Fore River S. B. Co.		No report.
Orca	Union Iron Works.		No report.
Walrus	The Moran Co.		No report.
COLLIERS.			
Neptune	Maryland Steel Co.	96.1	98.2

*Mayrant was delivered at navy yard, Philadelphia, July 10, 1911.
*Monaghan was delivered at navy yard, Norfolk, June 20, 1911.

ACCIDENTS OF A MONTH

The one serious accident of the month was the collision between the steamers W. H. Mack and John Mitchell near Crisp Point, Lake Superior, during thick weather. The Mack, which was downbound, light, struck the Mitchell, which was upbound with a cargo of coal, on the starboard side. Within seven minutes thereafter she had disappeared, rolling completely over as she went down. Three lives were lost. The photographs of the Mack published elsewhere in this issue, indicate that the impact must have been severe. The Mack's bow was badly crushed and about 30 of her plates were damaged.

The steamer John W. Gates of the Pittsburg Steamship Co.'s fleet sank the wooden steamer Tampa in the Detroit river off Walkerville on July 18. This accident was one of the unavoidable kind, the Gates' steering gear breaking and causing her to take an abrupt sheer shoreward. The Tampa was torn away from her moorings and sank within 10 minutes in about 15 ft. of water. The Pittsburg Steamship Co. is now engaged in raising her.

During the heavy wind storm of July 25 the steamer Rappahannock, belonging to the fleet of Capt. James Davidson, of Bay City, began to leak, and the captain beached her at Jackfish Point, Lake Superior. However, she later slid off into deep water and sank, becoming a total loss.

The steamer Robert C. Wente sprang a leak while loading lumber at Manistee and sank, drowning one member of the crew. The accidents are tabulated as follows:

Date.	Name of Vessel.	Nature of Accident.	Place.
July 5	Carferry Ashtabula	Two steel hopper cars dropped into slip, breaking her apron. Delayed ten days for repairs	Ashtabula Harbor, O.
July 7	Str. W. S. Calvert	Ran aground	Maumee River.
July 7	Tug T. C. Lutz	Ran ashore; crew taken off; released on July 15 and docked at yard of Great Lakes Towing Co., Cleveland	Gull Island Reef, Lake Erie.
July 7	Tug Fairmount	Struck while trying to release the tug Lutz; shoe and rudder damaged; put back to Sandusky for repairs	Gull Island Reef, Lake Erie.
July 10	Str. John Mitchell	Collided with Str. W. H. Mack in fog; three of crew drowned; sank; loss about $300,000; coal cargo, $38,500	Near Whitefish, Lake Superior.
July 10	Str. W. H. Mack	Collided with Str. John Mitchell [illegible] crushed, stem gone and thirty plates damaged; docked at Lorain; repair bill about $17,000.	Near Whitefish, Lake Superior.
———	Str. Waccamaw	Struck, damaging No. 1 and 2 tanks; docked at Buffalo	Lachine canal.
July 12	Str. Caspian	Ran ashore in dense fog	Lake Ontario near Belleville.
July 12	Str. North King	Broke her crank shaft; drifted about and was driven ashore; passengers taken off	Lake Ontario.
July 16	Str. Maine	Burned to water's edge; total loss	Marine City, Mich.
———	Str. W. G. Mather	Broke her steering gear; repaired at Marquette	———
July 15	Tug Alva B	Got log in her wheel and broke crank shaft	———
July 18	Str. Tampa	Sunk by Str. John W. Gates while lying at dock unloading; accident caused through breaking of steering gear on the Gates. Two large holes on port side	Detroit river, off Walkerville.
July 18	Str. John W. Gates	Steering gear broke, causing to sheer into Str. Tampa; lost her port anchor which was rammed into Tampa's side	Detroit river, off Walkerville.
———	Str. Huron	Struck; several plates on bottom bent and cracked; temporarily repaired at Sault	Richard's Landing, near Sault.
July 21	Str. Orinoco	Became disabled and was towed to Duluth by Str. Shenandoah	Outer Island, Lake Superior.
July 22	Bge. Paul Krueger	Sprang leak inside breakwater and sank; floated on July 27 and docked for repairs	Cleveland.
July 24	Str. Snook	Washed high on beach during storm	Buffalo.
July 24	Scow Douglas	In tow of Str. Snook and also washed ashore	Buffalo.
———	Str. Robert Fulton	Struck while leaving lock; No. 2 tank leaked and one plate damaged; docked at Toledo July 26; repairs completed on July 28	Poe Lock, Sault canal.
July 24	Str. Langdon	Returned to Port Huron during storm with broken quadrant	———
July 24	Str. J. T. Hutchinson	Grounded while leaving port in storm	Toledo harbor.
July 25	Str. Rappahannock	Began leaking in mid-lake in storm and when captain beached her on Point she slid back and sank; total loss	Jackfish Point, Lake Superior.
July 25	Bge. Montezuma	Broke away from Str. Rappahannock in storm; found lying at anchor near Grand Island by Str. Sacramento and towed to Duluth	Lake Superior.
July 26	Str. Amazonas	Dragged anchors while lying in shelter and ran ashore; released on July 27; slightly damaged; repaired at Bay City	Glen Arbor bay, Lake Michigan.
July 26	Bge. Paisley	Broke away from Str. Amazonas while lying at anchor and ran ashore; released Aug. 1	Glen Arbor bay, Lake Michigan.
———	Sch. Hattie Wells	Lost deck load of lumber in storm	Lake Superior.
———	Bge. Aurora	Broke away from Str. Chas. L. Hutchinson in storm; lost her rudder; picked up by Str. Hutchinson 24 hours later and towed to Sault where new rudder was put on	Lake Superior.
July 26	Bge. G. E. Hartnell	Collided with Str. Seneca; starboard bow damaged and an anchor lost	Chicago.
July 30	Str. Robert C. Wente	Sprang a leak while loading lumber and sank; one man drowned	Manistee, Mich.
July 30	Str. Italia	Ran aground near entrance owing to low water	Niagara river.
July 31	Str. Perfection	While leaving port on her first trip broke bracket on reversing gear of main engine; delayed a day	Lorain, O.

The firm of Peter Wright & Sons, Philadelphia, discontinued business on June 30. This firm has been identified with American and foreign shipping for the past ninety-four years, and its retirement from the field is a matter of general regret.

The Mathews Steamship Co.'s steamer Yorktown arrived at Toronto during July, from Sunderland, England, where she was built. She is of the single-deck type of arch construction, and is 257 ft. long, 42½ ft. beam and 18½ ft. deep.

On July 15 the steel tug boat S. Q. Brown, belonging to the East Jersey Railroad & Terminal Co., was launched from the yard of the Staten Island Ship Building Co., Port Richmond, S. I. Robert H. Laverie, chief surveyor for the United States for the Bureau Veritas, is superintending the construction of the boat. The tug is 95 ft. long, 23 ft. beam and 10 ft. 6 in. deep, equipped with a compound engine 16 and 32 by 24 in. stroke.

The Pittsburg Steamship Co. is building a new supply store at Conneaut which, when completed, will be the finest on the chain of lakes. It will be three stories in height and of entirely fire-proof construction. It will have an ice-making plant of 40 tons capacity daily.

The steamer Queen City, which was in collision with the steamer Charles L. Hutchinson at Bar Point, was taken to the Lorain yard of the American Ship Building Co. for repairs. Her starboard bow was badly damaged.